A grid of composite models for the simulation of starburst galaxy and HII region spectra

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Abstract

A grid of models for starburst spectra is presented and compared with power-law models which represent AGNs. The models are composite, i.e., they account for the radiation from the starburst and for the shocks created by super-winds. Some interesting fit of models to observations are also discussed. In particular, it is found that [OIII]/Hβ can reach values as high as for the AGN when the emitting clouds are close to the starburst region. Moreover CIV lines can be high even if SiIV lines are relatively low. It is found that for some line ratios, which have similar values for starburst and AGN models, the width of the lines can distinguish between the two types.

1 Introduction

One of the important issues in the interpretation of the galactic nuclei spectra is to recognize their nature, particularly, whether they correspond to active nuclei or starbursts. Modeling on a large scale may give the key to rapidly discover the spectral type of observed objects.

Theoretical starburst and HII region spectra available in the literature are calculated assuming that stellar radiation ionizes and heats circumstellar clouds. In more recent photoionization models, the ionizing radiation spectrum of a stellar cluster is used (Cid-Fernandes et al. 1992, Stasinska & Leitherer 1996). However, it is hardly conceivable that a stationary regime could survive in regions around evolving stars. It has been suggested that, in regions with high rates of star formation in a starburst galaxy, an energetic, galactic scale wind - a superwind - may result from the prodigious amount of energy injected by the stars within the surrounding gas (Chevalier & Clegg 1986). Among the manifestations of such a superwind (Lehnert & Heckman 1995) shocklike line ratios would be of particular interest. As shown by the models of Leitherer & Heckman (1995), the ratio between the mechanical energy and the ionizing Lyman continuum, both injected in the ISM by the massive star population, rapidly increases during the stellar cluster evolution. Thus, it is expected that the emission-line spectrum of the ionized gas changes its characteristics, i.e., from a photoionized gas spectrum to a shock-photoionized spectrum. In fact, the observed infrared emission-line ratios of a sample of starburst galaxies (Lutz et al. 1998) revealed a continuous sequence between two extreme cases: starburst regions where shocks in high-velocity clouds are necessary to explain the observational data and those where the shock contribution is less significant (Viegas, Contini & Contini 1999).

Moreover, there have been many suggestions that starbursts may play an important role in Seyfert galaxies (see, for instance, Heckman et al. 1997).

By quantifying the relative energetic importance of young stars and the hidden Seyfert nucleus in their sample, Gonzalez-Delgado, Heckman, & Leitherer (2001) suggest that optical emission line diagnostics are "also potentially useful". Particularly, they suggest that the [OIII] 5007/Hβ ratio contains information about the sources of ionizing photons in the Seyfert 2 nuclei.

In this paper we present a grid of models for the calculation of starburst (STB) spectra, where the physical conditions of the emitting gas are determined by the effect of a shock front coupled to photoionization by a stellar cluster. The SUMA code (Viegas & Contini 1994) is adopted. The aim of this paper is to investigate the more relevant characteristicts of STB spectra and compare them with spectra calculated with a power-law (PL) ionizing radiation, representing the AGN characteristic spectra (Contini & Viegas 2001, hereafter referred to as CV01). Shock dominated (SD) models can be found in CV01.

In order to present the results, the emission-lines are selected among those potentially giving relevant information about the source, the physical conditions of the emitting gas, and the relative importance between the STB and AGN characteristics. Not only strong lines are considered, since sometimes weak lines can provide significant information. Therefore, a relatively large number of lines in the UV-optical-IR ranges (see CV01) are included in the tables.

In §2, the models are presented. A comparison between STB and PL emission-line ratios appears in §3 and the confrontation of model results with observational data follows in §4. Concluding remarks are presented in §5.

2 The models

The SUMA code is used to obtain the physical conditions and the emission-line spectrum of a gas cloud ionized and heated by an ionizing radiation and by a shock front. A plane-plarallel symmetry is assumed. Considering that shocks due to supernova explosions develop during the cluster evolution and propagate outwards, it is assumed that the shock front and photoionization act on opposite edges of the cloud. The input parameters are the ionizing radiation spectrum, the elemental abundances (H, He, C, N, O, Ne, Mg, Si, S, A, and Fe), the shock velocity, V_s, the preshock density, n_0, the preshock magnetic field, B_0, and the cloud geometrical thickness, D. For all models, the elemental abundances are taken from Allen(1973) and B_0 is equal to 10^{-4} gauss.

The ionizing radiation spectrum is characterized by its shape and by the value of the ionizing parameter at the photoionized edge. Two different types of spectra are considered:

(a) A black body spectrum (BB) which could represent the spectrum of the field stars. Thus three black body temperatures are considered. The lowest one ($T_*=10^4$ K) represents the case of rather old stars and could provide the physical conditions of some HII regions,whereas $T_*=5\times 10^4$ K are characteristic of STB galaxies (Viegas, Contini, & Contini 1999). Finally, $T_*= 10^5$ K could represent the young stars and/or the "warmers" (Terlevich et al. 1992). These models are less realistic. However, the results can be compared to other blackbody photoionization models that have been largely used in the literature.

(b) A stellar cluster spectrum (Cid-Fernandes et al. 1992), which is a more realistic spectrum. The spectrum is characterized by the cluster age, from 0 to 5.4 Myr. More evolved clusters show fewer photons above 54.4 eV, producing intermediate and high ionization lines too faint compared to observations. Notice that the mass of the stellar cluster defines its luminos-

ity. Thus the value adopted for the ionization parameter U is related to the stellar cluster mass.

Before discussing the results of the models given in the grid, we would like to provide some suggestions on how to use the models to obtain the physical conditions of the emitting gas and a rough interpretation of observed spectra, as well as to select between power law and stellar cluster spectra.

As a first approach, we suggest to analyse a strong line, e.g. [OIII] 5007+, and compare models with very similar [OIII]/Hβ ratios. The [OIII]/Hβ line ratio depends mainly on the ionizing radiation field. On the other hand, [OII]/Hβ line ratio is more sensitive to the velocity field. A high [OII]/Hβ line ratio indicates that shocks give a significant contribution to the emission line spectrum. In addition, high velocity shocks produce a high temperature post-shock zone which can originate high ionization emission lines. The shock velocity is roughly indicated by the FWHM of the observed line profiles and constrains the models. Low neutral lines indicate matter-bound clouds, usually associated to a small geometrical thickness. The [SII] 6717/6730 doublet ratio is a density indicator. However, in models accounting for shocks, the density distribution inside the cloud results from downstream compression, which may be very different from the preshock density n_0. Notice that clouds with different velocities and different physical conditions may contribute to the observed emission-line spectrum of a single galaxy. Thus, the main difficulty is to disentangle the contribution from single clouds. Some modeling examples can be found in our previous papers (Contini, Prieto & Viegas 1999a,b).

2.1 Black-body spectra

The results for the three black body temperatures are presented in Tables 1-4. Each table corresponds to a different value of V_s and n_0. The ionization parameter U shows a large range (0.01-10.) in order to cover most of the

observed conditions.

In the following, a brief comparison to PL models is presented for the different models caracterized by the (V_s, n_0) values.

First, the results corresponding to V_s= 100 km s^{-1} and n_0 = 100 cm^{-3} (Table 1) are discussed. Unless stated otherwise, in the following the line results are relative to Hβ.

High [OIII]5007+Hβ ($\geq$ 10), which are characteristic of the NLR spectra in Seyfert 2 galaxies, could be produced also in the surroundings of a hot star with T_*=10^5 K . Compared with a PL model (CV01, model 13) which also shows a high [OIII]5007+/Hβ, the BB models show fainter low ionization line ratios.

High [OIII]/Hβ ($\sim$ 16) can also be found for PL models with log F_h between $\sim$ 11.5 - 11.6 (CV01 models 16 and 17). In this case the gas is highly ionized, the low ionization zone is reduced, so the low ionization lines are negligible, while coronal lines in the IR are strong ([SiIX], [MgVIII], etc). Notice that BB models with T_*=10^5 K and U=1 can provide [OIV]/Hβ stronger than PL models. This BB model also show high HeII 1640 and CIV 1550.

LINER spectra are characterized by [OIII]/Hβ of about 5. The choice of the model depends on the Fe coronal lines. If [FeX] and [FeXI] are strong, PL models with high F_h are required. However, if Fe coronal lines are negligible the critical line is [SIII] 9532+. See for instance, model 12 from CV01, which shows negligeble Fe coronal lines, but [SIII] stronger by a factor of $\sim$ 10, when compared to the BB results.

The results calculated with V_s=200 km s^{-1} and n_0=200 cm^{-3} appear in Table 2. [OIII]/Hβ $\sim$ 4-10 results from BB models (T_*=5 10^4 K and T_*=10^5 K). They correspond to PL models with log F_h= 11.48-11.78 (CV01, models 36 and 37). Higher [OIII]/Hβ ($\sim$ 22-40) result from T_*=10^5 K corresponding to PL models with log F_h=12-12.48 (CV01, models 38 and 39). However, UV line are definitively stronger in the PL case, as also the Hβ absolute

flux. Infrared coronal lines are also stronger in the PL case, while neutral and singly ionized lines in the infrared ([NeII], [FeII], [CI], [CII], etc) are definitively higher for BB models. [OIII]/[OII] is less than 1 for $T_*=10^4$ K.

The results of models calculated with V_s=300 $\mathrm{km\,s^{-1}}$ and n_0=300 $\mathrm{cm^{-3}}$ are given in Table 3. Hβ absolute values are strong for both PL and BB models, therefore, the line ratios are relatively low. SD models are characterized by higher line ratios because Hβ is very low.

Regarding the results of models calculated for V_s=500 $\mathrm{km\,s^{-1}}$ and n_0=300 $\mathrm{cm^{-3}}$ (Table 4), the spectra resulting from BB models, by varying T_* and U, are very similar because the effect of the shock and, particularly, of diffuse radiation prevails. Hβ absolute flux is very high (> 600 $\mathrm{erg\,cm^{-2}\,s^{-1}}$). The models of Table 4 are all characterized by strong HeII both in the UV and in the optical ranges. In a similar PL case (CV01, model 66, log F_h= 12) [OII]/Hβ ratio is slightly higher and CIV lines are weaker. In the IR, [OIV] and [NeIII]15.5 lines are strong in both cases. High ionization lines, relative to Hβ, are faint not only because Hβ is strong, but also due to compression which reduces the volume of the zone where they can be produced.

2.2 Stellar cluster models

The emission-line results are presented in Tables 5-10. The models are calculated adopting D=10^{19} cm in Tables 6, 8, 10. Matter-bound models calculated with D = 10^{17} cm are given for V_s=100 and 300 $\mathrm{km\,s^{-1}}$(Tables 5, 7) and with D = 10^{18} cm for V_s=500 $\mathrm{km\,s^{-1}}$ (Table 9). A higher D is adopted for V_s= 500 $\mathrm{km\,s^{-1}}$ because a large zone of highly ionized gas is created downstream by high shock velocities (see CV01). The matter-bound models are presented for comparison and for helping modeling. However, the narrower the cloud the smaller the low-ionization zone located at the cloud central region. Thus, for more realistic modeling many different D should be considered. In fact, fragmentation produced by the presence of shocks (through

turbulence and instability effects) can reduce the geometrical thickness of the clouds by different amounts. Thus, when modeling specific objects the contribution of clouds with different geometrical thickness should be taken into account. Notice that matter-bound and radiation-bound models depend on U and V_s, as well as on geometrical thickness D. Models corresponding to D=10^{17} cm are generally matter-bound, as indicated, for instance, by the low theoretical values of the [OI]/Hβ and [NI]/Hβ line ratios.

A general look at the tables indicates that for V_s=100 km s^{-1}and n_0=100 cm^{-3} UV lines (1033-1892 Å) are stronger for t $\geq$ 3.3 Myr. In the optical range (3426-7892 Å) some lines (e.g. [OII]3727, [OIII]5007, HeI 5876, [NII]6548+, and [SII] 6716,6730) can also be relatively strong at a lower age, however, they drastically increase for t $\geq$ 3.3 Myr and relatively low U. In the near-infrared range (9532 Å- 3.9 μm) the lines, which are mostly emitted from high ionization states, are observable only for STB of a higher age. In the infrared range (5.5 - 157.7 μm), high ionization level lines are strong for t $\geq$3.3 My, intermediate ionization lines (e.g., [SIV]) are relatively strong also at lower ages with high U. Low ionization lines are stronger the lower U. For V_s=300 km s^{-1} and V_s=500 km s^{-1} the effect of the shock is strong, and the line ratios change sensibly only for t $\geq$ 3.3 Myr.

3 Confrontation of STB versus PL model predictions

It is our goal to give a general discussion of the models in order to understand their behavior regarding the characteristics of the ionizing radiation and of the shock. In the following, only the comparison between STB and PL radiation-bound models is presented. The notation used in the figures is: starburst models corresponding to different ages are represented by dotted (t = 0 Myr, SBO models), short-dashed (t = 2.5 Myr, SB2 models) long-dashed (t = 3.3 Myr, SB3 models), short-dash-dotted (t = 4.5 Myr, SB4 models),

and long-dash-dotted (t = 5.4 Myr, SB5 models) lines. Power-law models are represented by a solid line. Shock-dominated models are represented by filled circles (in diagrams corresponding to a single V_s) and by a long-dash-short-dash line. When models corresponding to different values of the shock velocity are shown in the same figure, heavier lines refer to the highest V_s. For sake of clarity, only results corresponding to models with D = 10^{19} are plotted (Tables 6, 8, and 10).

Recall that this paper is aimed to present a grid of results of STB models, therefore, only a few significant cases are presented in the diagrams. Particularly, in the UV range the Lyα/Hβ line ratio shows very high values which could explain uncommon observational results. Other permitted lines, as e.g. CIV, NV and SiIV, are strongly connected with star formation and are therefore discussed. In the optical-IR range we have chosen lines of the same element which are generally observed from different levels, as e.g. [NeIII] 3869+, [NeV] 3426, [NeIII] 15.55 and [NeV] 24.3. The [NeIII] 3869+/Hβ behavior is similar to that of [OIII] 5007+/Hβ. The calculated O lines ([OIII] 5007+, [OII] 3727, and [OI] 6300) will be compared with observational data.

3.1 UV lines

Lyα and HeII 1640

Lyα/Hβ versus HeII 1640/Hβ is given in Fig. 1 for SB3, SB4, and SB5 models and different V_s. For SB1 and SB2 the calculated HeII lines are low for V_s=100 and 300 $\mathrm{km\,s^{-1}}$, and they are constant for V_s=500 $\mathrm{km\,s^{-1}}$ and different U, reducing to a point in the diagram (see Tables 6, 8 and 10).

The high jump of Lyα /Hβ for U $\leq$ 0.1 (SB3) and V_s=100 $\mathrm{km\,s^{-1}}$, which appears also for U=0.01 (SB4 and SB5), is investigated in Figs. 2. Here, the physical conditions and the H fractional abundance are shown in two cases: for U=0.1 (top diagram) and U=1 (bottom diagram), corresponding to Lyα/Hβ=106. and 24.8, respectively, and Hα/Hβ= 4. and 2.77, respectively. For U = 0.1, the gas is heated to 10^4 K in a region where hydrogen has a significant neutral fraction, consequently (Ferland & Osterbrock 1985), the intensities of Hα and especially of Lyα are significantly enhanced, although the intensity of Hβ remains near its pure recombination value (because 1-4 collisions are much less frequent than 1-3 or 1-2 collisions). For U = 1 (bottom diagram) the ionization parameter is high enough to fully ionize hydrogen throughout the cloud and the value of Lyα/Hβ is lower.

The He II 1640/4686 versus He II 1640/Hβ ratios are shown in Fig. 3. Notice the gap between SD models and RD models, for both models with PL and STB ionizing spectra.

NV 1240, SiIV 1397, and CIV 1549

Starburst galaxies have been investigated through the massive star wind properties by Robert et al. (1993). Unambiguous spectral features from massive stars, which display characteristic profiles of SiIV 1397 and CIV 1550), are most easily found in the UV (Weedman et al 1981). Robert et al. consider a burst model with a finite duration of the star formation

process. The emission-line SiIV 1397 is due to massive stars and is strong only for a short time, around $10^{6.5}$ yr, in the case of the instantaneous burst. Such a strong emission is not seen in the continuous burst models since main-sequence stars, which are continuously being born, dilute the SiIV contribution coming from the more massive evolved stars. A strong SiIV emission is rarely, if ever, seen in starburst galaxies.

Our approach, is, however, different, because we consider the lines emitted by clouds lighted by a STB (e.g. NV, SiIV, CIV, etc) to test for either a STB component or a AGN one in the UV spectra.

In Fig. 4, the results of PL models and STB models are shown in the left and right panels, respectively. PL models show an increase of NV/Hβ proportionally to CIV/Hβ. Models with high velocities (≥ 300 km s^{-1}) give low line ratios. This is explained by the strong compression donwstream which reduces the emission region of lines from the IV and V levels, whereas an extended region of Hβ emission is supported by a large F_h. The trend is different for STB models (top right diagram). The line ratios increase for higher velocities. Moreover, they give strong CIV/Hβ even for low NV/Hβ.

A maximum value of the order of unity is reached by SiIV/Hβ lines (bottom diagrams). Regarding the PL models, the maximum values is reached for PL models with V_s=100 km s^{-1} and log F_h=11.48. On the other hand, the maximum value can be found in several STB models and there is not a univocal relationship between CIV and SiIV line intensities.

Notice that SiIV/Hβ calculated line ratios are very low. Let us recall that, the observed SiIV lines could be blended with those of the OIV 1400 multiplet due to wavelength proximity. Therefore, they must be used with caution.

3.2 Optical-IR lines

[NeIII]3869,[NeV]3426, [NeIII]15.55, and [NeV]24.3

Usually neon is less depleted than other elements because it is not easily locked up into dust grains owing to its electronic configuration.

We have chosen lines from the same ions (Ne^{+2} or Ne^{+4}) but in different ranges (optical and IR) to search for similarities and differences between STB and PL models. The results are shown in Figs. 5 for V_s=100, 300, and 500 $km\,s^{-1}$.

The first three panels (Figs. 5a, b, and c) show that when the shock velocity is low (V_s=100 $km\,s^{-1}$) and photoionization prevails on shock effects,the results from PL models, with F$> 10^{11}$ photons cm^{-2} s^{-1} eV^{-1}, are similar to those from SB3, SB4, and SB5 models with U $>$ 0.1. A younger stellar cluster (SB0 models) give similar results to PL ionizing source in a small range of F_h (log F_h between 8 and 9.48). On the other hand, for higher V_s, SB3, SB4, and SB5 models show higher [NeIII]3869/Hβ ratios if U $>$ 0.1. For V_s=500 $km\,s^{-1}$all the values for SB0 and SB2 are concentrated in one point, with [NeIII] 3869/Hβ about 11 and [NeIII]/Hβ about 2.

Fig. 6 shows that high [NeV]/[NeIII] ratios both in the optical and IR ranges favors the starburst models, although PL models with V_s=100 $km\,s^{-1}$and a high F_h can also give a high [NeV]/[NeIII]. Notice that, in Fig. 6, only SB3, SB4, and SB5 models are shown. Because young stellar clusters have a deficit in high energy photons, SB0 and SB2 provide very low values of [NeV]/Hβ, not seen in HII regions. So, high [NeV]/[NeIII] line ratios showing broad profiles of the single lines refer to starbursts.

4 Comparison with observations

When observational data are available, we prefer to compare our theoretical lines with those observed in different locations of a given galaxy, rather than data from several galaxies.

The phenomena STB and AGN can coexist in one galaxy. Thus, when adopting a single average model as representative of a galaxy, as generally used in diagnostic diagrams (see Veilleux & Osterbrock 1993) a large part of information is lost. Therefore, we have chosen NGC 7130 that was observed in different regions (Shields & Filippenko 1990, Radovich et al. 1997, etc) for modeling the most observed oxygen lines.

Observational data for the sample of edge-on STB galaxies by Lehnert & Heckman (1995)are available for different position within each galaxy. The [SII], [NII], and [OI] lines are considered. The distribution and scattering of the data in the nuclear, near-nuclear, and off-nuclear regions indicate the gas conditions.

II Zw 40 is one of the STB galaxies observed by Doherty et al (1995). Different values of the He I 5876/Hβ ratios, corresponding to different observations, are reported in Doherty et al. (Table 4 there).

Finally, [SIII] 9532 emission is chosen as another example in order to illustrate that the discussion about the range of the [SIII]/Hα line ratios (Kennicutt & Pogge 1990) can be settled by comparing the data with model results.

[OI]/Hβ, [OII]/Hβ, [OIII]/Hβ

The O lines [OI]6300+, [OII]3727, and [OIII]5007+ are generally observed in AGN and starburst galaxies, and provide an indicator of the shape of the ionizing radiation spectrum. The results for these lines appear in Fig. 7a and b and are compared to the observational data from the Seyfert 2

galaxy NGC 7130 (Shields & Filippenko 1990). The spectra were taken in different regions at P.A.=11.5^o.

It is well known that this Seyfert galaxy contains starbursts in the circumnuclear regions. Our aim is to show that the models can explain the observations. As this work focus on the models and not on a particular investigation of special objects, we display in the figures not only the diagram area limited by the data, but we include a larger area in order to show many model results.

The results are shown for shock velocities of 100, 300, and 500 $\mathrm{km\,s^{-1}}$(top, middle, and bottom diagrams, repectively). Shock-dominated model results, corresponding to F_h= 0, are indicated as filled circles.

For low velocity, PL models are similar to SB3, SB4, and SB5 models (Fig. 7a) For higher V_s, the results are strongly affected by compression and by the physical conditions downstream. For V_s=300 and 500 $\mathrm{km\,s^{-1}}$, [OI]/Hβ as high as 1 is obtained only by PL models with a low F_h. The STB models give smaller values. Particularly, SB3 models show higher [OIII]/Hβ to [OI]/Hβ ratios relative to PL models.

A better fit is obtained for low velocities and low ionization parameters, and a young stellar cluster (t = 0.0 to 2.5 Myr). For a few data near the center of the galaxy, PL models give a better fit.

The same general considerations are valid for the [OIII]/Hβ versus [OII]/Hβ ratios, shown in in Fig. 7b. Notice, however, that models calculated with low ionization parameter (U = 0.01) give a better fit of the [OII]/Hβ than of the [OI]/Hβ ratios. Models with higher U better reproduce the neutral lines. Therefore, we prefer to explain this discrepancy between the [OI]/Hβ and [OII]/Hβ fits by adopting matter-bound models (Contini et al 2001).

[NII]/Hβ and [SII]/Hβ

The NII and SII lines are also easily observed. In Figs. 8a,b model re-

sults are compared with the observation data of Lehnert & Heckman (1995) for ionized gas in the halos of edge-on starburst galaxies. The nuclear, near-nuclear, and off-nuclear data appear in the top, middle, and bottom diagrams, respectively. The large scattering, particularly in the near- and off-nuclear regions indicate that many different conditions characterize the different galaxies of the sample. Observations corresponding to the minor and major axis are represented respectively by filled and open symbols. For near- and off- nuclear data the observations come from two positions on each axis (major and minor) of the galaxy. The data have been multiplied by a factor of 3 in order to obtain the line intensities relative to Hβ instead of Hα.

The diagram [SII]/Hβ versus [NII]/Hβ is shown in Fig. 8a. It can be noticed that, in all of three diagrams, the data are inside a region covered by STB models.

By reducing S/H by a factor of 2-3, the fit with models calculated for a t = 2.5 Myr and a V_s of 100 $\mathrm{km\,s^{-1}}$ improves.

However, PL models with V_s=300 $\mathrm{km\,s^{-1}}$ and a rather low F_h, as well as shock-dominated models with $V_s \leq$ 300 $\mathrm{km\,s^{-1}}$ could also provide a good fit to the data (PL models calculated with V_s= 100 and 500 $\mathrm{km\,s^{-1}}$ do not appear in the diagrams for sake of clarity; moreover, they are out of the observed range). Once more, this indicates that single models can hardly be used and that [SII] and [NII] lines are not a good indicator of the galaxy type, whether a STB or a AGN. Observational data correspond to emission coming from regions with different physical conditions not easily fitted by a single model.

On the other hand, concerning the diagram [OI]/Hβ versus [NII]/Hβ (Fig. 8b), a better fit to the data is obtained with STB models, strengthening the hypothesis that the less precise fit in Fig. 8a could be due to the cosmic S/H abundance adopted in the model, as pointed out above. Notice that

upper limits of [OI]/Hβ are also included in Fig. 8b diagrams.

HeI 5876/Hβ and HeI 4471/Hβ

A heterogeneous sample of starburst galaxies is used to analyse the He lines in Fig. 9 (PL models are not included in the figure for sake of clarity, because they concide with STB models). The data come from Doherty, Puxley, Lumsden, & Doyon (1995). STB models calculated for an age ≥ 3.3 Myr, U$\leq$ 1, and V_s between 100 and 300 $\mathrm{km\,s^{-1}}$ fit the data corresponding to the highest He I 5876/Hβ ratios. Lower ratios are not fitted by the present models. Particularly, shock-dominated models and STB models corresponding to a young stellar cluster are out of the observed range. Notice, however, that the HeI lines can be affected by the geometrical thickness of the emitting cloud. A narrower cloud could have the He^+ emitting zone reduced, producing fainter HeI lines.

[SIII] 9532 emission

Observations of [SIII]/(Hα+[NII]) line ratios for HII regions in infrared-luminous galaxies (NGC 520, NGC 660, NGC 1068, NGC 2146, and M82) are given by Kennicutt & Pogge (1990) to critically examine these ratios as quantitative extinction tracer in HII regions. The comparison of the data (corresponding to [SIII]/(Hα+[NII]) between 0.2 and 1.18) with the results of some models in Tables 5-16 gives a good agreement.

5 Concluding remarks

By presenting a grid of composite models for STB galaxies we have shown that the ionization parameter and the shock velocity play an important role. We have calculated the emission-line spectra from clouds in the neighborhood of a STB within a galaxy, considering both the radiation and the effect of a super-wind.

Particularly, we have found that only STB and SD models can give a very high Lyα/Hβ ratio. The result for the STB has been explained by the very special profile of H^+ fractional abundance throughout a cloud.

Another important result concerns the CIV lines. It is found that CIV/Hβ can be high even if NV/Hβ and, particularly, SiIV/Hβ are relatively low. This happens in clouds very close to the STB, for an age of t $\geq$ 3.3 Myr. High CIV and NV lines correspond to V_s of about 500 $\mathrm{km\,s^{-1}}$ in the STB, and to V_s of about 100 $\mathrm{km\,s^{-1}}$ in the AGN case. *The FWHM of the line profile permits to distinguish between the two types.* For SiIV, similar low values result also from PL models, which would correspond to AGN emission-line spectra. The SiIV emission line is usually faint since, due to the low SiIV ionization potential, SiV is the dominant ion and the SiIV emitting volume is small.

Very high [NeV]/[NeIII] in both the optical and IR domains are always indicative of a STB, if the FWHM of the line profile is > 100 $\mathrm{km\,s^{-1}}$.

The results of a large grid of models show that [OIII]/Hβ can be high (> 10) also for STB, although it is generally suggested that [OIII]/H$\beta \leq 1$ (Gonzalez Delgado et al 2001). This implies U > 0.01 and leads to [OI]/H$\beta \leq$ 1 for V_s= 100 $\mathrm{km\,s^{-1}}$. For higher V_s, [OI]/Hβ is very low (≤ 0.01). Because of the low critical density for collisional deexcitation (about 3000 $\mathrm{cm^{-3}}$), the [O II] optical line is less adapted to modelling in a general way.

Regarding the Lehnert & Heckman sample of starburst galaxies, it seems that sulphur should be underabundant to give a better fit to the data (see Fig. 8a). On the other hand, Fig. 8b shows that the data are mostly explained by STB models, particularly in the nuclear region. Although not shown in the figure, PL models corresponding to V_s=100 $\mathrm{km\,s^{-1}}$ overpredict the [OI] lines, while the those with V_s=300 $\mathrm{km\,s^{-1}}$ and V_s=500 $\mathrm{km\,s^{-1}}$ poorly fit the observational trend.

For low ionizing radiation intensities the models are strongly shock domi-

nated, confirming the important role of shocks in modeling the low ionization line ratios.

Regarding HeI 5876/Hβ, model results indicate that HeI/H$\beta \leq$ 0.08 for II Zw 40 are not well reproduced by the models presented here, but models with narrower emitting clouds may provide a better fit to the observations.

In a forthcoming paper (Contini, Viegas & Contini, in preparation) we use the models of the present grid to analyse the emission-line spectra of starburst galaxies, comparing young and old starburst dominated objects, as was done in a previous paper (Viegas et al. 1999).

Concluding, we hope that the grid presented in this work will provide more understanding about the physical conditions in STB galaxies.

We strongly recommend to consider single observed spectra in each region of a galaxy during the modeling process. The final result should then be obtained by a weighted average in order to have a more reliable picture of the conditions prevailing in the emittion region. It is well known that many different conditions coexist. Therefore, modeling a single global spectrum from a galaxy can give only a first, rough hint of the real conditions.

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Figure Captions

Fig. 1

Lyα/Hβ versus HeII 1640/Hβ.

Dotted, short-dashed, long-dashed, short-dash dotted, long-dash dotted lines refer to STB models (see text) and are labeled by U. Solid lines refer to PL models. The arrow indicates the direction of increasing F_h. Concerning models with different velocities, the notation is the following: V_s=100 km s^{-1}: thin lines, 300 km s^{-1}: medium lines, and 500 km s^{-1}: thick lines. Long-dash-short-dash lines refer to shock-dominated (SD) models, labelled by the lowest V_s. The results correspond to models with D = 10^{19} cm.

Fig. 2

The distribution of the electron temperature, of the electron density, and of the fractional abundance of H^+ and O^{+2} throughout a cloud with D=10^{19} cm, V_s=100 km s^{-1}, and n_0=100 cm^{-3}. Top diagram : U=0.1, bottom diagram : U=1. The diagrams are symmetrically divided in two halves to better compare the conditions in the shock dominated and radiation dominated edges. The shock front is on the left.

Fig. 3

HeII 1640/ HeII4686 versus HeII 1640/Hβ. Notation as in Fig. 1.

Fig. 4

Top diagrams : CIV 1550/Hβ versus NV 1240/Hβ; left : PL models, right : STB models. Bottom diagrams : CIV 1550/Hβ versus SiIV 1397/Hβ; left : PL models, right : STB models. Notation as for Fig. 1. See also the text.

Fig. 5

[NeIII] 15.55/Hβ versus [NeIII] 3869/Hβ for three different V_s: a) 100 km s^{-1}, b) 300 km s^{-1}, c) 500 km s^{-1}. Notations as for Fig. 1, except for SD models which are represented by a filled circle.

Fig. 6

[NeV]24.3/[NeIII] 15.55 versus [NeV] 3426/[NeIII]3869. Notation as in Fig. 1.

Fig. 7

a) [OIII] 5007+/Hβ versus [OI] 6300+/Hβ for V_s=100 $km\,s^{-1}$(top diagram), 300 $km\,s^{-1}$(middle diagram), and 500 $km\,s^{-1}$(bottom diagram). Notation as in Fig. 4. Observational data are indicated by filled triangles.

b) [OIII] 5007+/Hβ versus [OII] 3727/Hβ for V_s=100 $km\,s^{-1}$(top diagram), 300 $km\,s^{-1}$(middle diagram), and 500 $km\,s^{-1}$(bottom diagram). Notation as in Fig. 6a.

Fig. 8

a) [SII] 6717+6730/Hβ versus NII] 6548+6584/Hβ. Models are compared with data in the nuclear (top diagram), near-nuclear (middle diagram), and off-nuclear (bottom diagram). Notation as in Fig. 1. Filled triangles refer to observations along the minor axis and empty triangles along the major axis. Squares represent the data on the same axis but on the other side of the nucleus.

b) [OI] 6300+6363/Hβ versus [NII] 6548+6584/Hβ, using the same notation as in Fig. 7a.

Fig. 9

HeI 5876/Hβ versus HeI 4471/Hβ for starburst galaxies. Notations as in Fig. 1. Observational data correspond to filled triangles.

Fig. 1

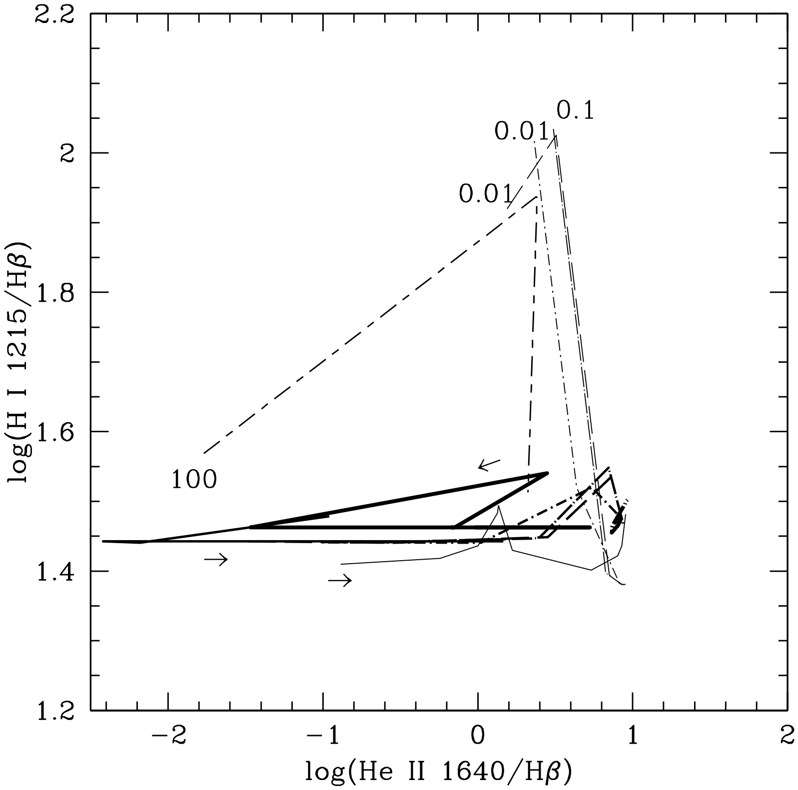
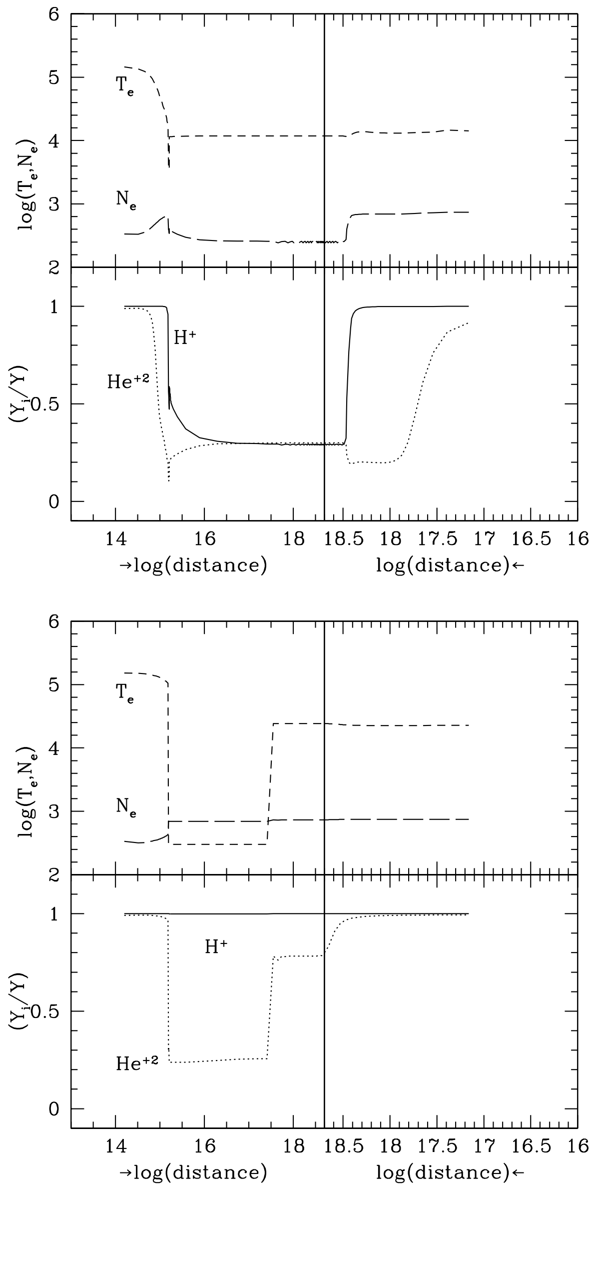

0.1
0.01
0.01
100
log(H I 1215/Hβ)
log(He II 1640/Hβ)
2.2
2
1.8
1.6
1.4
1.2
−2
−1
0
1
2

Fig. 2



log(T_e,N_e)
T_e
N_e
(Y_i/Y)
H+
He+2
14
16
18
18.5
18
17.5
17
16.5
16
→log(distance)
log(distance)←

Fig. 3

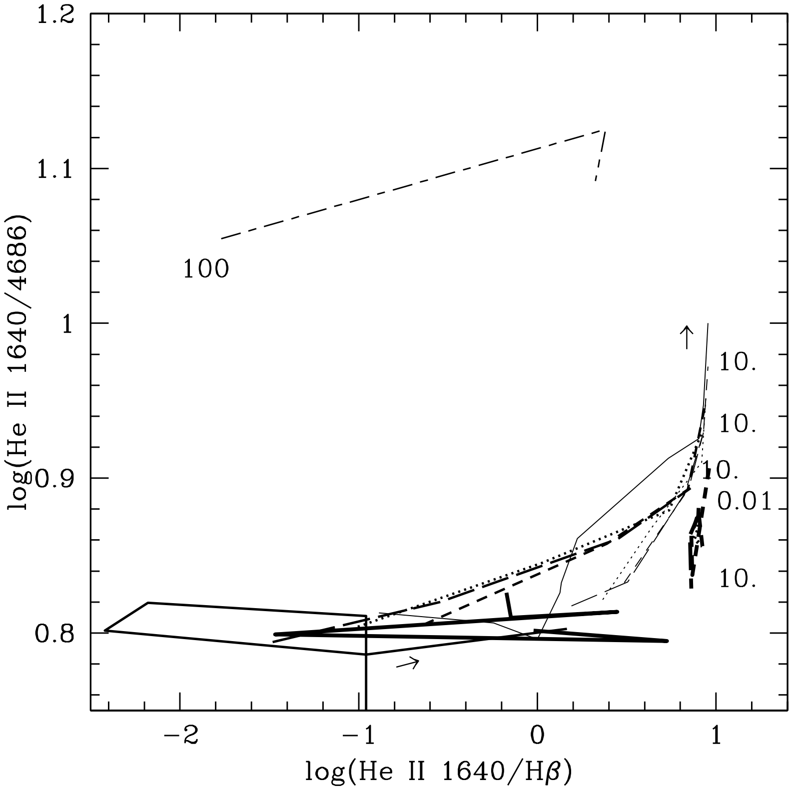
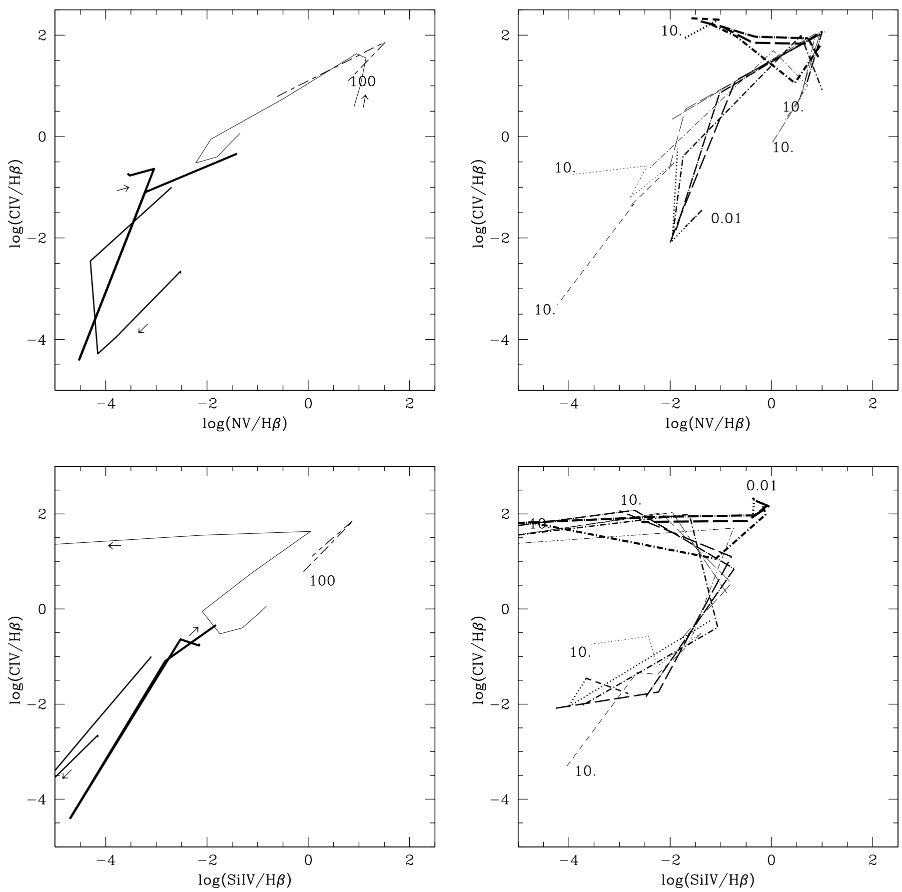

1.2
1.1
1
0.9
0.8
log(He II 1640/4686)
100
10.
10.
10.
0.01
10.
−2
−1
0
1
log(He II 1640/Hβ)

Fig. 4



2
0
−2
−4
−4
−2
0
2
log(NV/Hβ)
log(CIV/Hβ)
100
10.
10.
10.
10.
10.
0.01
log(SiIV/Hβ)
0.01

Fig. 5a

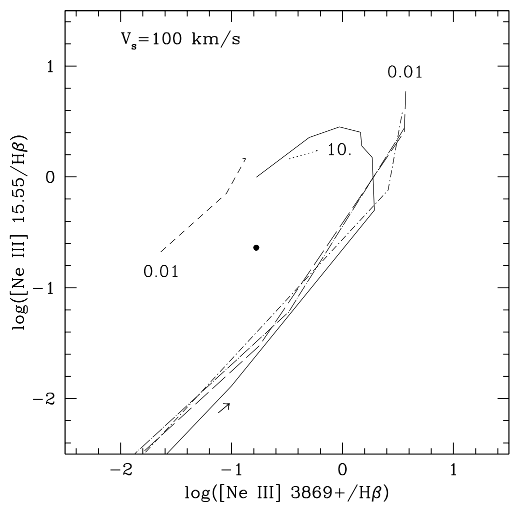


Fig. 5b

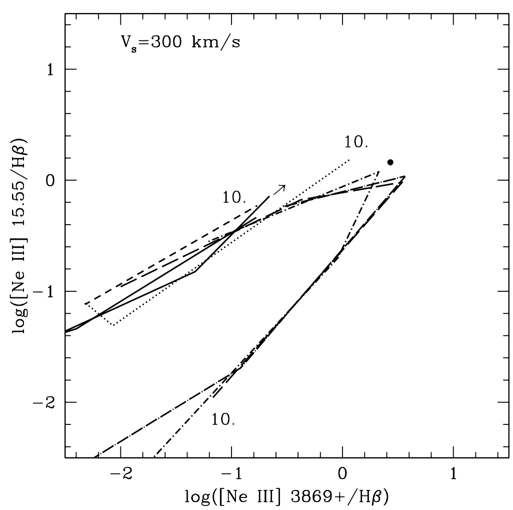


Fig. 5c

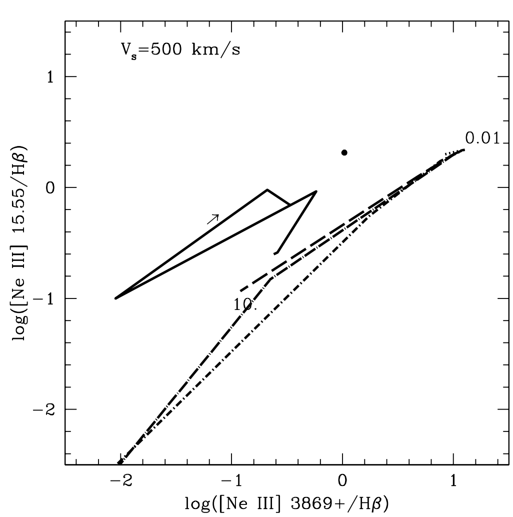
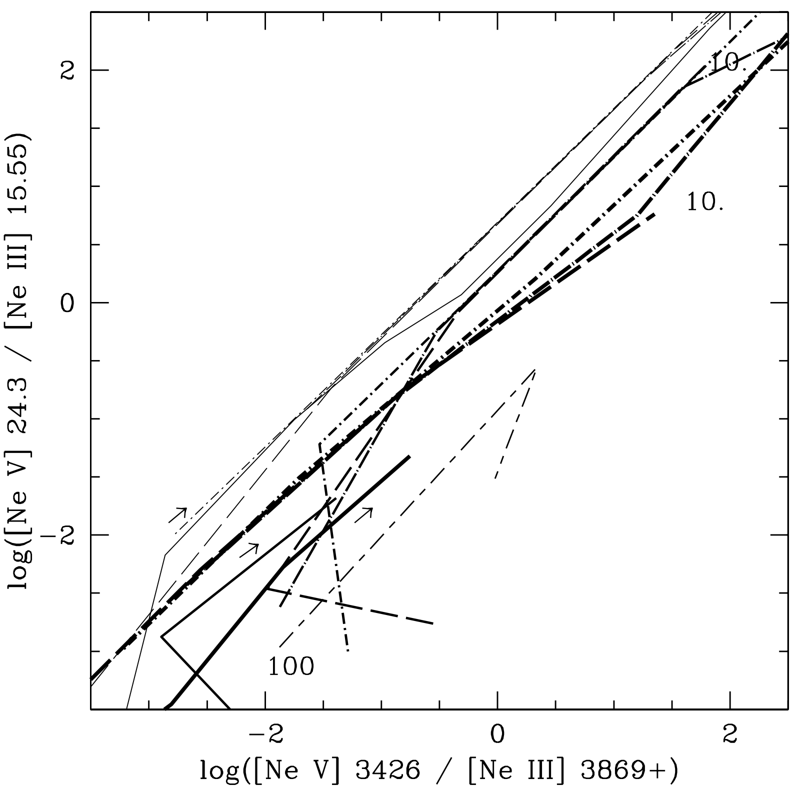
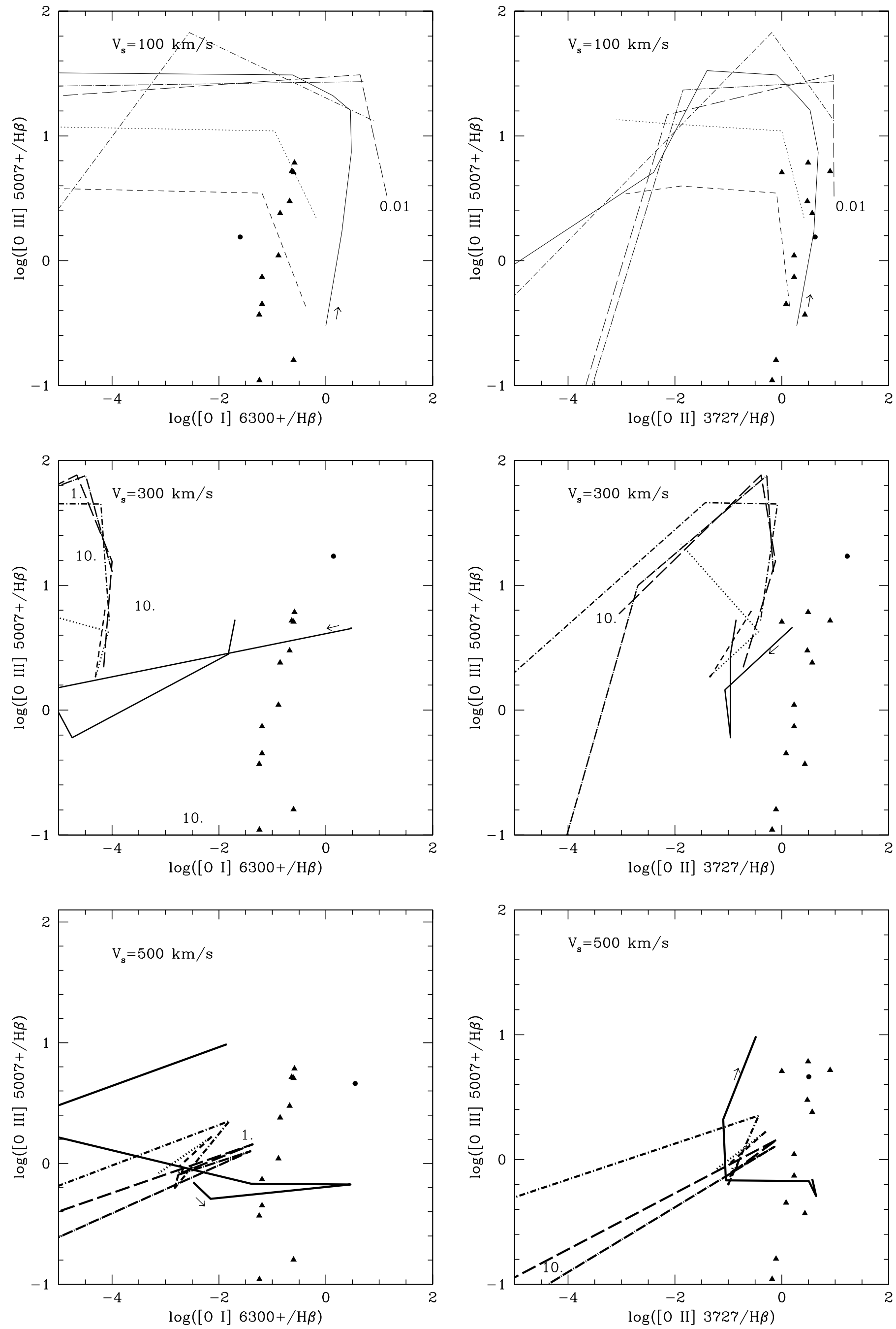


Fig. 6



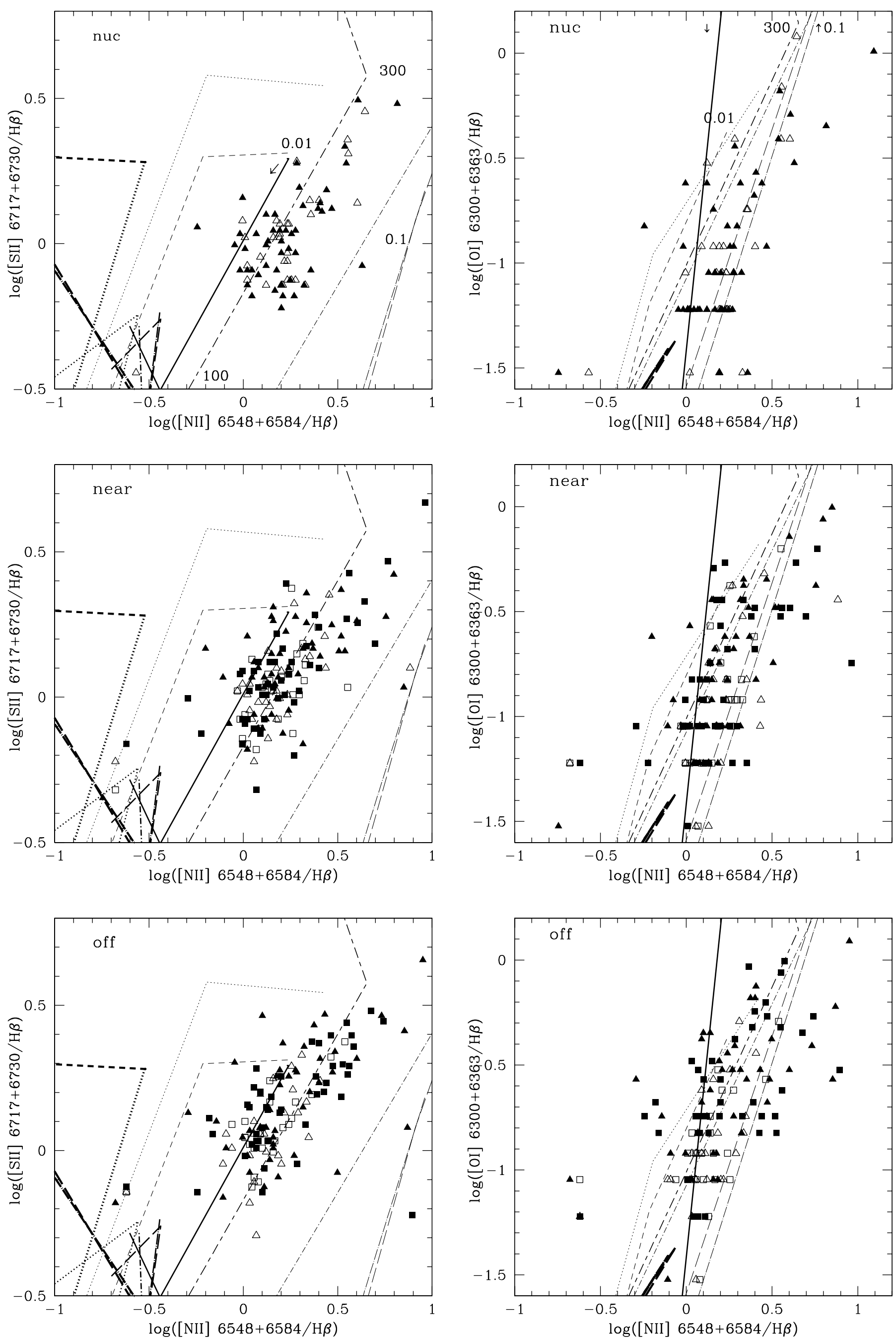
log([Ne V] 24.3 / [Ne III] 15.55)
log([Ne V] 3426 / [Ne III] 3869+)
10.
10.
100
2
0
−2
−2
0
2

Fig. 7a Fig. 7b



V_s=100 km/s
0.01
log([O III] 5007+/Hβ)
log([O I] 6300+/Hβ)
V_s=100 km/s
0.01
log([O II] 3727/Hβ)
V_s=300 km/s
1.
10.
10.
10.
V_s=300 km/s
10.
V_s=500 km/s
1.
V_s=500 km/s
10.

Fig. 8a Fig. 8b



nuc
300
0.01
0.1
100
log([SII] 6717+6730/Hβ)
log([NII] 6548+6584/Hβ)
nuc
300
0.01
↑0.1
log([OI] 6300+6363/Hβ)
log([NII] 6548+6584/Hβ)
near
log([SII] 6717+6730/Hβ)
log([NII] 6548+6584/Hβ)
near
log([OI] 6300+6363/Hβ)
log([NII] 6548+6584/Hβ)
off
log([SII] 6717+6730/Hβ)
log([NII] 6548+6584/Hβ)
off
log([OI] 6300+6363/Hβ)
log([NII] 6548+6584/Hβ)

Fig. 9

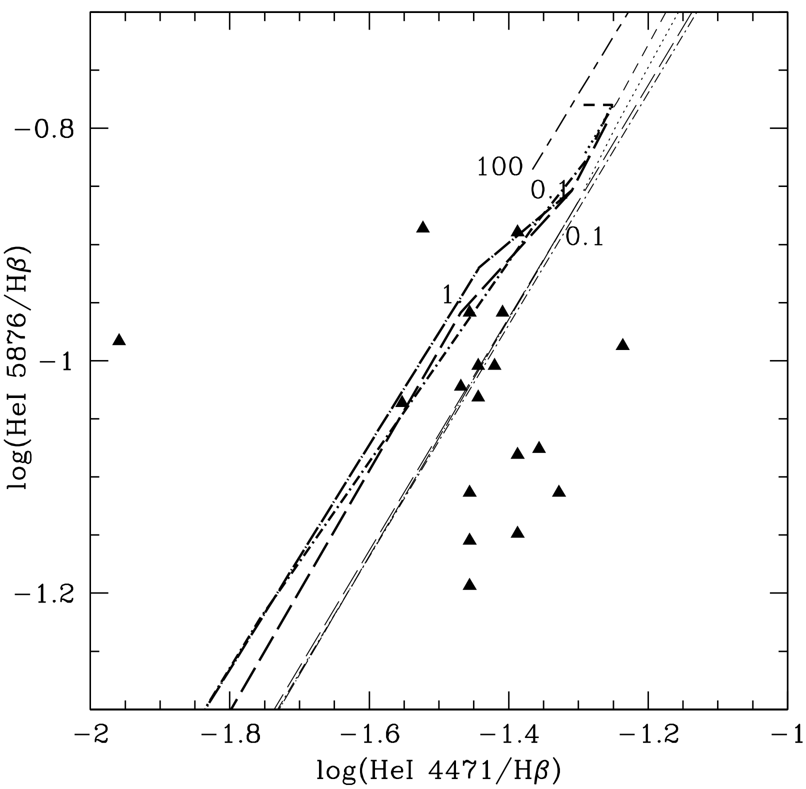


Table 1

The models : V_s=100 $km\,s^{-1}$, n_0=100 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
T_*(K)		1(4)	...	...	...	5(4)	...	...	...	1(5)	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	3(-5)	6.6(-6)	9.(-7)	3.7(-7)	5.(-5)	9.3(-6)	7.5(-6)	5.3(-7)	5.(-5)	1.(-5)	0.018	0.28
Si III	1206	0.027	6.(-3)	4.8(-4)	2.7(-7)	0.044	8.5(-3)	6.9(-4)	1.(-6)	0.046	0.012	7.7(-3)	4.(-5)
H I	1216	25.3	25.2	24.8	24.2	24.85	23.9	23.7	23.7	24.7	24.	23.5	34.4
N V	1240	0.005	1.1(-3)	1.5(-4)	4.7(-5)	8.(-3)	1.5(-3)	1.2(-3)	7.5(-5)	8.4(-3)	1.6(-3)	0.7	1.51
S II	1256	0.0025	5.5(-4)	1.5(-5)	3.6(-8)	4.5(-3)	1.(-3)	1.2(-5)	1.8(-9)	5.6(-3)	6.2(-3)	5.7(-6)	0.0
Si II	1264	6.(-4)	1.4(-4)	6.(-6)	4.4(-10)	1.3(-3)	2.7(-4)	4.6(-6)	1.(-10)	1.6(-3)	1.4(-3)	2.7(-5)	0.0
O I	1302+	6.(-5)	1.3(-5)	4.4(-7)	0.0	5.(-4)	9.4(-5)	6.7(-8)	0.0	4.9(-4)	1.5(-4)	0.0	0.0
Si IV	1397	0.017	3.7(-3)	4.4(-4)	4.1(-6)	0.027	5.3(-3)	2.4(-3)	4.3(-4)	0.029	5.4(-3)	0.31	0.026
O IV	1401+	0.035	0.012	1.1(-4)	2.(-4)	0.056	1.1(-3)	9.5(-3)	4.(-4)	0.06	0.014	2.0	0.7
N IV]	1486	0.022	4.8(-3)	6.7(-4)	1.2(-4)	0.03	7.(-3)	6.(-3)	2.(-3)	0.035	0.0185	1.55	0.3
C IV	1550	0.126	0.028	3.8(-3)	2.4(-4)	0.2	0.04	0.036	0.025	0.22	0.18	6.17	0.68
He II	1640	3.5(-4)	7.6(-5)	1.1(-5)	1.8(-5)	6.8(-3)	7.4(-3)	0.02	0.129	0.53	0.68	6.2	7.96
Si III	1892+	0.0023	5.(-3)	2.4(-4)	1.5(-5)	0.04	0.024	7.3(-3)	2.3(-4)	0.06	0.21	0.055	2.8(-4)
[Ne V]	3426	4.6(-5)	1.(-5)	1.4(-6)	4.3(-7)	7.5(-5)	1.4(-5)	1.2(-5)	1.(-6)	8.(-5)	1.(-3)	1.0	4.5
[O II]	3727	0.092	0.023	6.4(-3)	0.054	1.62	0.78	0.0145	1.7(-3)	3.	1.16	4.5(-3)	0.0
[Ne III]	3869+	3.6(-3)	8.(-4)	1.(-4)	1.9(-4)	0.085	0.25	0.23	0.3	0.53	0.93	0.76	0.012
[S II]	4073+	1.2(-3)	3.3(-4)	1.2(-4)	9.(-4)	0.1	0.12	1.7(-5)	0.0	0.22	0.36	2.5(-7)	0.0
[O III]	4363	2.6(-3)	5.7(-4)	7.7(-5)	3.4(-6)	5.2(-3)	7.8(-3)	6.9(-3)	9.8(-3)	0.017	0.06	0.09	7.7(-4)
He II	4686	3.1(-5)	7.(-6)	9.8(-7)	3.(-6)	1.(-3)	1.2(-3)	3.2(-3)	0.02	0.08	0.1	0.87	1.1
[O III]	5007+	0.032	7.(-3)	9.6(-4)	1.6(-3)	1.1	5.4	5.9	7.29	5.39	16.2	10.2	0.047
[N I]	5200+	3.5(-3)	8.(-4)	2.7(-7)	8.(-8)	0.02	3.4(-3)	3.7(-9)	0.0	0.022	0.013	0.0	0.0
He I	5876	0.068	0.016	3.3(-3)	0.032	0.24	0.17	0.15	0.15	0.24	0.14	0.03	1.1(-4)
[Fe VII]	6087	4.7(-6)	1.(-6)	1.5(-7)	3.9(-8)	7.7(-6)	1.5(-6)	1.2(-6)	5.5(-8)	8.(-6)	1.5(-6)	1.8(-6)	1.1
[O I]	6300+	0.017	4.8(-3)	1.5(-6)	2.3(-7)	0.35	0.081	2.4(-8)	0.0	0.52	0.113	0.0	0.0
[Fe X]	6374	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[N II]	6548+	0.024	0.01	0.024	0.22	1.69	0.53	4.2(-3)	1.3(-4)	2.46	0.65	3.5(-4)	0.0
[S II]	6716	0.062	0.015	0.011	0.033	1.17	1.2	1.7(-4)	0.0	2.07	2.5	8.8(-7)	0.0
[S II]	6731	0.046	0.012	0.013	0.036	1.13	1.26	1.8(-4)	0.0	2.03	2.6	8.(-7)	0.0
[O II]	7325	7.9(-3)	2.4(-3)	9.1(-4)	1.(-3)	0.033	0.015	2.1(-4)	2.5(-5)	0.07	0.032	1.7(-4)	0.0
[Fe XI]	7892	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hβ *		0.039	0.18	1.28	0.95	0.024	0.12	0.156	0.67	0.023	0.12	0.1	0.37
[S III]	9532+	0.045	0.01	3.1(-3)	0.31	0.16	0.066	0.24	6.(-3)	0.19	0.11	8.(-3)	6.(-10)
[C I]	9850	4.6(-6)	1.6(-7)	1.4(-7)	0.0	1.7(-4)	4.1(-5)	3.(-9)	0.0	1.9(-4)	5.(-4)	0.0	0.0
[S VIII]	9913	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S IX]	1.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Si VI]	1.96	7.8(-8)	1.7(-8)	2.4(-9)	0.0	1.3(-7)	2.4(-8)	2.(-8)	1.2(-9)	1.3(-7)	2.5(-8)	3.(-8)	3.8(-4)
[Si VII]	2.48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Si IX]	2.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Mg VIII]	3.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Si IX]	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Mg VII]	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[Mg V]	5.6	1.4(-6)	3.(-7)	4.2(-8)	1.3(-8)	2.2(-6)	4.3(-7)	3.4(-7)	1.9(-8)	2.3(-6)	4.3(-7)	5.(-7)	1.05
[Ne VI]	7.6	8.6(-9)	2.(-9)	2.6(-10)	1.(-10)	1.4(-8)	2.7(-9)	2.2(-9)	1.4(-10)	1.4(-8)	2.9(-6)	5.3(-3)	0.11
[Ar III]	8.99	7.6(-3)	2.3(-3)	1.9(-3)	3.4(-3)	0.027	0.024	0.059	3.4(-3)	0.045	0.048	3.5(-3)	2.(-10)
[S IV]	10.54	4.3(-4)	9.6(-5)	2.(-5)	2.5(-4)	7.(-4)	1.8(-4)	4.0	1.97	7.4(-4)	1.9(-4)	1.08	2.9(-3)
[Ne II]	12.8	0.25	0.14	0.27	0.37	0.68	0.14	4.4(-3)	4.4(-4)	0.46	0.07	1.(-4)	0.0
[Ne V]	14.32	4.(-6)	8.8(-7)	1.2(-7)	3.5(-8)	6.4(-6)	1.2(-6)	1.(-6)	1.3(-5)	1.4(-4)	0.016	1.97	9.0
[Ne III]	15.55	0.046	0.01	3.3(-3)	0.03	0.66	1.38	1.57	1.62	1.63	1.75	0.61	4.5(-3)
[S III]	18.7	0.19	0.04	0.025	0.61	0.33	0.07	0.125	2.9(-3)	.34	0.076	1.5(-3)	0.0
[Ne V]	24.3	5.3(-6)	1.2(-6)	1.6(-7)	4.7(-8)	8.5(-6)	1.6(-6)	1.3(-6)	1.2(-5)	1.3(-4)	0.016	2.0	9.2
[O IV]	25.9	1.4(-3)	3.2(-4)	4.5(-5)	7.4(-6)	3.7(-3)	8.2(-3)	0.03	0.33	0.21	1.75	20.8	5.96
[Fe II]	26.	1.11	0.47	0.26	0.019	1.73	0.42	9.(-7)	0.0	1.85	0.41	0.0	0.0
[S III]	33.5	0.36	0.077	0.024	0.6	0.61	0.12	0.125	2.9(-3)	0.64	0.12	1.6(-3)	0.0
[Si II]	34.86	4.87	1.53	0.17	1.9(-3)	7.89	1.79	2.9(-3)	2.1(-6)	8.35	1.75	1.2(-4)	0.0
[Ne III]	36.01	3.8(-3)	8.5(-4)	2.6(-4)	2.5(-3)	0.056	0.12	0.134	0.138	0.14	0.15	0.053	4.(-4)
[O III]	51.81	1.5(-3)	1.9(-3)	2.18(-3)	0.015	0.67	2.83	3.56	3.63	1.62	3.53	1.26	2.8(-3)
[O I]	63.18	1.64	0.33	5.3(-5)	2.2(-6)	2.83	0.47	0.0	0.0	2.97	0.46	0.0	0.0
[O III]	88.36	8.9(-4)	7.9(-4)	8.7(-4)	6.4(-3)	0.31	1.3	1.62	1.67	0.78	1.73	0.63	1.5(-3)
[O I]	145.5	0.14	0.029	4.(-6)	1.6(-7)	0.25	0.041	0.0	0.0	0.26	0.04	0.0	0.0
[C II]	157.7	0.84	0.188	0.03	0.038	1.35	0.22	1.5(-4)	5.2(-6)	1.39	0.22	3.(-6)	0.0

* $erg\,cm^{-2}s^{-1}$

Table 2

The models : V_s=200 km s^{-1}, n_0=200 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
T_*(K)		1(4)	...	...	...	5(4)	...	...	...	1(5)	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	0.32	0.24	0.065	5.(-3)	1.66	0.24	0.065	7.(-3)	0.19	0.29	0.076	0.034
Si III	1206	7.5(-3)	5.6(-3)	1.5(-3)	3.3(-5)	0.04	5.7(-3)	2.(-3)	6.6(-5)	4.5(-3)	9.(-3)	0.02	2.4(-3)
H I	1216	23.9	24.4	25.4	25.8	24.8	24.3	25.2	25.4	37.2	24.8	25.64	25.1
N V	1240	0.018	0.014	3.7(-3)	2.8(-4)	0.094	0.0135	3.7(-3)	4.(-4)	0.01	0.017	5.7(-3)	0.34
S II	1256	4.3(-4)	3.2(-4)	8.7(-5)	1.(-6)	2.6(-3)	5.3(-4)	6.8(-4)	1.4(-7)	8.(-3)	4.1(-3)	0.0156	3.8(-7)
Si II	1264	1.4(-4)	1.(-4)	2.8(-5)	2.9(-7)	1.(-3)	1.7(-4)	1.4(-4)	1.2(-7)	5.1(-3)	1.3(-3)	2.1(-3)	1.4(-5)
O I	1302+	2.3(-5)	1.7(-5)	4.3(-6)	2.8(-8)	5.4(-4)	3.(-5)	4.2(-5)	7.(-10)	6.4(-3)	1.7(-4)	1.(-4)	3.4(-10)
Si IV	1397	5.(-3)	3.8(-3)	1.(-3)	4.9(-5)	0.026	3.8(-3)	1.(-3)	2.5(-3)	3.(-3)	4.7(-3)	1.9(-3)	0.12
O IV	1401+	0.033	0.025	0.012	5.2(-4)	0.078	0.025	7.(-3)	7.(-4)	0.02	0.03	0.025	0.55
N IV]	1486	0.01	7.5(-3)	2.(-3)	1.5(-4)	0.05	0.072	2.2(-4)	5.(-4)	6.(-3)	0.013	0.07	1.0
C IV	1550	0.046	0.035	9.4(-3)	7.1(-4)	0.24	0.035	0.012	5.(-3)	0.027	0.082	0.76	7.4
He II	1640	5.8(-4)	4.3(-4)	1.2(-4)	9.6(-6)	5.6(-3)	2.1(-3)	5.5(-4)	1.8(-3)	0.15	0.26	0.8	1.1
Si III	1892+	5.1(-3)	3.8(-3)	1.(-3)	7.2(-5)	0.029	0.017	0.062	0.01	8.6(-3)	0.11	0.61	0.017
[Ne V]	3426	3.3(-6)	2.5(-3)	6.7(-4)	5.1(-5)	0.017	2.4(-3)	6.6(-4)	7.2(-5)	1.9(-3)	3.(-3)	0.012	0.35
[O II]	3727	0.72	0.55	0.2	0.067	2.7	1.03	0.43	8.7(-3)	7.5	1.23	0.49	5.5(-3)
[Ne III]	3869+	0.022	0.017	4.3(-3)	1.9(-4)	0.22	0.125	0.4	0.38	1.5	0.46	1.27	2.5
[S II]	4073+	0.13	0.1	0.033	9.3(-3)	0.4	0.19	0.3	1.1(-5)	0.8	0.33	0.8	1.5(-7)
[O III]	4363	8.6(-4)	6.4(-4)	1.7(-4)	1.1(-5)	4.7(-3)	4.6(-3)	0.018	0.015	1.(-3)	0.03	0.12	0.38
He II	4686	4.4(-5)	3.3(-5)	8.8(-6)	7.9(-7)	6.3(-4)	3.(-4)	7.7(-5)	2.7(-4)	0.022	0.039	0.12	0.15
[O III]	5007+	0.01	8.2(-3)	3.(-3)	1.3(-3)	0.21	1.97	8.45	8.9	0.16	6.62	22.2	40.7
[N I]	5200+	0.19	0.133	0.32	8.(-7)	2.1	0.13	0.03	0.0	0.24	0.14	0.08	0.0
He I	5876	0.27	0.2	0.056	9.8(-3)	0.42	0.24	0.17	0.15	0.34	0.23	0.13	0.12
[Fe VII]	6087	7.4(-4)	5.5(-4)	1.5(-4)	1.1(-5)	3.8(-3)	5.4(-4)	1.5(-4)	1.6(-5)	4.3(-4)	6.7(-4)	1.7(-4)	3.3(-5)
[O I]	6300+	2.55	1.89	0.47	5.5(-6)	7.13	1.89	0.49	2.2(-10)	7.3	1.77	0.32	1.2(-10)
[Fe X]	6374	8.6(-7)	6.4(-7)	1.7(-7)	1.3(-8)	4.4(-6)	6.4(-7)	1.7(-7)	1.9(-8)	5.(-7)	7.8(-7)	2.(-7)	3.5(-8)
[N II]	6548+	6.33	4.85	1.5	0.3	3.2	4.96	1.39	3.8(-3)	15.6	4.64	0.4	1.2(-4)
[S II]	6716	2.1	1.57	0.46	0.067	4.2	1.75	0.96	2.6(-5)	4.2	1.86	1.43	2.2(-7)
[S II]	6731	2.16	1.63	0.52	0.12	4.3	1.95	1.4	4.6(-5)	5.1	2.22	2.33	3.6(-7)
[O II]	7325	0.013	0.01	3.9(-3)	1.5(-3)	0.07	0.034	0.016	3.6(-4)	0.27	0.06	0.029	5.3(-4)
[Fe XI]	7892	2.6(-9)	1.9(-9)	5.2(-10)	0.0	1.3(-8)	2.(-9)	5.(-10)	6.(-11)	1.5(-9)	2.3(-9)	6.(-10)	1.(-10)
Hβ *		0.52	0.69	2.55	33.3	0.1	0.7	2.58	23.5	0.88	0.57	2.19	13.
[S III]	9532+	5.0	3.74	0.99	0.06	9.54	3.8	1.26	0.16	6.	3.65	1.2	3.9(-3)
[C I]	9850	4.6(-4)	7.(-5)	2.8(-6)	0.0	0.05	6.(-4)	5.(-5)	0.0	2.7(-3)	7.4(-4)	1.3(-4)	0.0
[S VIII]	9913	3.9(-6)	2.9(-6)	7.9(-7)	6.(-8)	2.(-5)	2.9(-6)	8.(-7)	8.6(-8)	2.3(-6)	3.6(-6)	9.3(-7)	1.6(-7)
[S IX]	1.25	2.7(-8)	2.(-8)	5.4(-9)	4.(-10)	1.4(-7)	2.(-8)	5.3(-9)	6.(-10)	1.6(-8)	2.4(-8)	6.3(-9)	1.1(-9)
[Si VI]	1.96	1.6(-4)	1.2(-4)	3.2(-5)	2.5(-6)	8.(-4)	1.2(-4)	3.2(-5)	3.(-5)	9.3(-5)	1.44(-4)	3.8(-5)	3.9(-4)
[Si VII]	2.48	7.8(-5)	5.9(-5)	1.6(-5)	1.2(-6)	4.(-4)	5.8(-5)	1.6(-5)	1.7(-6)	4.6(-5)	7.1(-5)	1.8(-5)	3.2(-6)
[Si IX]	2.59	9.(-8)	6.8(-8)	1.8(-9)	1.4(-9)	4.6(-7)	6.7(-8)	2.(-8)	2.(-9)	5.3(-8)	8.2(-8)	2.(-8)	3.7(-9)
[Mg VIII]	3.03	1.3(-5)	1.(-5)	2.7(-6)	2.1(-7)	6.9(-5)	9.9(-6)	2.7(-6)	3.(-7)	8.(-6)	1.2(-5)	3.2(-6)	5.4(-7)
[Si IX]	3.9	1.7(-7)	1.3(-7)	3.4(-8)	2.6(-9)	8.7(-7)	1.2(-7)	3.4(-8)	4.(-9)	1.(-7)	1.5(-7)	4.(-8)	6.9(-9)
[Mg VII]	5.5	1.1(-4)	8.5(-5)	2.3(-5)	1.7(-6)	5.8(-4)	8.4(-5)	2.3(-5)	2.5(-6)	6.6(-5)	1.(-4)	2.7(-5)	4.6(-6)
[Mg V]	5.6	8.4(-5)	6.3(-5)	1.7(-5)	1.3(-6)	4.3(-4)	6.4(-5)	3.6(-5)	1.6(-4)	4.9(-5)	7.7(-5)	4.5(-5)	4.(-4)
[Ne VI]	7.6	6.4(-4)	4.8(-4)	1.3(-4)	9.9(-6)	3.3(-3)	4.7(-4)	1.3(-4)	1.4(-5)	3.7(-4)	5.8(-4)	2.(-4)	3.1(-3)
[Ar III]	8.99	0.47	0.36	0.12	0.036	0.65	0.4	0.23	0.032	0.63	0.4	0.24	2.2(-3)
[S IV]	10.54	1.2(-3)	1.(-3)	7.9(-4)	7.6(-4)	2.2(-3)	2.9(-3)	0.013	3.87	8.6(-4)	3.1(-3)	0.019	0.7
[Ne II]	12.8	1.63	1.25	0.54	0.37	2.46	1.24	0.32	2.8(-3)	1.0	1.11	0.08	1.1(-4)
[Ne V]	14.32	1.8(-4)	1.3(-4)	3.6(-5)	2.8(-6)	9.2(-4)	1.3(-4)	3.6(-5)	4.(-6)	1.(-4)	1.(-3)	0.074	0.45
[Ne III]	15.55	0.41	0.31	0.084	0.016	1.35	0.65	1.34	1.55	2.84	0.88	1.64	1.72
[S III]	18.7	3.8	2.85	0.78	0.077	4.73	2.82	0.8	0.06	2.48	2.63	0.36	7.4(-4)
[Ne V]	24.3	2.4(-4)	1.8(-4)	5.(-5)	3.7(-6)	1.2(-3)	1.8(-4)	4.9(-5)	5.3(-6)	1.4(-4)	7.4(-4)	0.045	0.33
[O IV]	25.9	9.1(-4)	6.8(-4)	1.8(-4)	1.4(-5)	4.7(-3)	1.3(-3)	5.4(-4)	1.5(-3)	1.(-3)	0.2	1.4	2.
[Fe II]	26.	4.2	3.18	0.9	0.074	5.	3.11	0.8	2.(-11)	3.1	2.9	0.25	0.0
[S III]	33.5	4.09	3.05	0.79	0.026	5.34	3.	0.77	0.02	2.41	2.78	0.27	3.1(-4)
[Si II]	34.86	10.4	7.82	2.13	0.017	12.6	7.68	1.95	2.5(-4)	6.34	7.12	0.58	1.8(-5)
[Ne III]	36.01	0.035	0.026	7.(-3)	1.2(-3)	0.11	0.053	0.1	0.12	0.24	0.072	0.13	0.14
[O III]	51.81	3.5(-4)	7.(-4)	1.5(-3)	2.7(-3)	0.028	0.3	1.23	1.54	0.018	0.53	1.63	2.0
[O I]	63.18	7.0	5.2	1.3	3.3(-5)	9.56	5.13	1.26	0.0	4.83	4.72	0.38	0.0
[O III]	88.36	1.4(-4)	1.8(-4)	2.7(-4)	4.6(-4)	5.(-3)	0.052	0.21	0.27	4.1(-3)	0.095	0.29	0.39
[O I]	145.5	0.47	0.35	0.088	1.57(-6)	0.64	0.34	0.084	0.0	0.3	0.32	0.025	0.0
[C II]	157.7	0.46	0.33	0.089	7.(-3)	0.57	0.33	0.08	2.3(-5)	0.25	0.3	0.023	4.2(-7)

* erg $cm^{-2}s^{-1}$

Table 3

The models : V_s=300 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
T_*(K)		1(4)	...	...	...	5(4)	...	...	...	1(5)	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	2.9(-3)	2.9(-3)	3.(-3)	6.7(-3)	3.(-3)	2.9(-3)	3.(-3)	1.9(-3)	0.014	2.9(-3)	3.(-3)	2.9(-3)
Si III	1206	7.2(-6)	7.2(-6)	7.1(-6)	1.9(-6)	1.(-5)	1.6(-5)	2.3(-5)	5.9(-4)	4.6(-5)	9.4(-5)	5.2(-4)	0.019
H I	1216	27.2	27.2	27.25	27.6	27.2	27.2	27.25	27.6	27.1	27.24	27.26	27.59
N V	1240	1.(-4)	9.9(-5)	1.(-4)	2.3(-4)	1.(-4)	9.9(-5)	1.(-4)	4.5(-5)	4.6(-4)	1.(-4)	1.3(-4)	3.6(-3)
S II	1256	7.(-6)	7.(-6)	7.2(-6)	1.7(-6)	9.(-6)	1.2(-5)	2.4(-5)	4.8(-4)	4.7(-5)	5.3(-5)	3.6(-4)	9.8(-3)
Si II	1264	9.2(-7)	9.2(-7)	1.4(-6)	2.3(-7)	1.1(-6)	1.3(-6)	5.9(-6)	5.4(-5)	9.(-6)	3.3(-6)	6.8(-5)	4.9(-4)
O I	1302+	2.(-9)	2.(-9)	8.(-7)	2.1(-8)	2.2(-9)	2.5(-9)	2.7(-6)	1.4(-7)	1.9(-6)	2.7(-9)	4.7(-6)	5.7(-9)
Si IV	1397	4.2(-6)	4.2(-6)	4.2(-6)	2.7(-6)	5.1(-6)	5.8(-6)	8.3(-6)	1.5(-4)	2.4(-5)	1.6(-5)	7.7(-5)	2.4(-3)
O IV	1401+	1.(-4)	1.(-4)	1.(-4)	2.4(-4)	1.(-4)	1.(-4)	1.1(-4)	5.(-6)	5.(-4)	3.(-4)	6.5(-4)	1.4(-3)
N IV]	1486	4.3(-6)	4.5(-6)	4.7(-6)	1.5(-5)	4.7(-6)	5.(-6)	1.1(-5)	9.(-5)	2.2(-5)	9.(-5)	1.5(-3)	0.07
C IV	1550	7.(-5)	7.1(-5)	7.3(-5)	1.6(-4)	7.3(-5)	7.6(-5)	1.5(-4)	9.6(-4)	3.4(-4)	7.7(-4)	0.017	0.81
He II	1640	8.7(-3)	8.6(-3)	8.7(-3)	9.(-3)	8.9(-3)	8.7(-3)	8.7(-3)	1.4(-4)	0.036	9.8(-3)	0.024	0.19
Si III	1892+	2.9(-3)	2.9(-3)	2.9(-3)	6.(-4)	3.5(-3)	3.5(-3)	4.8(-3)	0.077	0.0157	5.3(-3)	0.018	0.46
[Ne V]	3426	2.8(-5)	2.8(-5)	2.9(-5)	6.3(-5)	2.8(-5)	2.8(-5)	2.9(-5)	1.4(-5)	1.3(-4)	2.8(-5)	1.5(-4)	0.012
[O II]	3727	0.1	0.1	0.13	0.078	0.11	0.1	0.11	1.08	0.026	0.103	0.11	0.26
[Ne III]	3869+	4.2(-3)	4.2(-3)	4.3(-3)	1.9(-3)	4.6(-3)	5.2(-3)	0.015	0.2	0.019	7.7(-3)	0.036	0.73
[S II]	4073+	0.05	0.05	0.05	0.021	0.053	0.05	0.06	0.33	0.15	0.05	0.075	0.51
[O III]	4363	1.2(-3)	1.1(-3)	1.1(-3)	1.6(-4)	1.3(-3)	1.2(-3)	1.7(-3)	0.013	6.2(-3)	1.6(-3)	4.3(-3)	0.08
He II	4686	1.4(-3)	1.4(-3)	1.4(-3)	1.4(-3)	1.4(-3)	1.4(-3)	1.4(-3)	2.2(-5)	5.7(-3)	1.5(-3)	3.7(-3)	0.028
[O III]	5007+	1.18	1.18	1.17	0.12	1.25	1.2	1.4	5.57	5.62	1.255	1.7	15.7
[N I]	5200+	2.(-6)	2.(-6)	5.(-6)	2.3(-4)	2.(-7)	2.(-6)	7.(-6)	2.2(-5)	2.2(-6)	2.1(-6)	6.2(-6)	2.9(-6)
He I	5876	0.17	0.17	0.16	0.019	0.17	0.17	0.17	0.15	0.155	0.17	0.17	0.146
[Fe VII]	6087	1.2(-5)	1.3(-5)	1.3(-5)	2.3(-5)	1.3(-5)	1.3(-5)	1.3(-5)	1.8(-5)	5.5(-5)	1.3(-5)	1.3(-5)	3.8(-5)
[O I]	6300+	1.2(-5)	1.2(-5)	5.7(-3)	4.8(-3)	1.2(-5)	1.2(-5)	6.5(-3)	4.9(-4)	1.6(-3)	1.2(-5)	6.2(-3)	1.5(-5)
[Fe X]	6374	3.(-6)	3.(-6)	3.1(-6)	6.8(-6)	3.(-6)	3.(-6)	3.1(-6)	2.6(-6)	1.4(-5)	3.(-6)	3.1(-6)	2.9(-6)
[N II]	6548+	0.38	0.38	0.4	0.34	0.4	0.38	0.4	1.3	0.019	0.39	0.39	0.43
[S II]	6716	0.087	0.087	0.088	0.044	0.09	0.088	0.09	0.28	0.2	0.09	0.1	0.38
[S II]	6731	0.17	0.17	0.177	0.089	0.18	0.177	0.19	0.58	0.39	0.18	0.2	0.78
[O II]	7325	3.4(-3)	3.4(-3)	3.5(-3)	3.2(-3)	3.8(-3)	3.8(-3)	4.4(-3)	0.11	1.9(-3)	3.8(-3)	5.(-3)	0.026
[Fe XI]	7892	2.6(-7)	2.6(-7)	2.7(-7)	5.9(-7)	2.6(-7)	2.6(-7)	2.7(-7)	2.3(-7)	1.2(-6)	2.6(-7)	2.7(-7)	2.5(-7)
Hβ		155.	155.	151.	68.4	153.7	155.	150.7	177.8	33.6	154.5	150.6	161.1
[S III]	9532+	0.32	0.32	0.32	0.17	0.33	0.32	0.34	0.85	0.64	0.32	0.35	1.11
[C I]	9850	1.5(-10)	2.(-8)	1.7(-7)	0.0	4.(-10)	3.4(-8)	4.8(-7)	2.2(-6)	2.6(-7)	4.7(-8)	4.2(-7)	1.3(-10)
[S VIII]	9913	1.1(-6)	1.1(-6)	1.2(-6)	2.6(-6)	1.1(-6)	1.1(-6)	1.2(-6)	9.7(-7)	5.2(-6)	1.1(-6)	1.2(-6)	1.1(-6)
[S IX]	1.25	4.2(-7)	4.2(-7)	4.3(-7)	9.6(-7)	4.3(-7)	4.2(-7)	4.3(-7)	3.6(-7)	1.9(-6)	4.2(-7)	4.3(-7)	4.1(-7)
[Si VI]	1.96	2.8(-5)	2.8(-5)	2.8(-5)	5.9(-6)	3.(-5)	2.9(-5)	2.9(-5)	6.5(-5)	7.7(-5)	2.9(-5)	2.9(-5)	1.1(-4)
[Si VII]	2.48	3.(-6)	3.(-6)	3.(-6)	6.8(-6)	3.(-6)	3.(-6)	3.1(-6)	2.5(-6)	1.4(-5)	3.(-6)	3.1(-6)	2.9(-6)
[Si IX]	2.59	2.5(-6)	2.5(-6)	2.6(-6)	5.7(-6)	2.5(-6)	2.5(-6)	2.6(-6)	2.2(-6)	1.2(-5)	2.5(-6)	2.6(-6)	2.4(-6)
[Mg VIII]	3.03	2.8(-6)	2.8(-6)	2.9(-6)	6.3(-6)	2.8(-6)	2.8(-6)	2.9(-6)	2.4(-6)	1.3(-5)	2.8(-6)	2.9(-6)	2.7(-6)
[Si IX]	3.9	4.7(-6)	4.7(-6)	4.8(-6)	1.1(-5)	4.7(-6)	4.7(-6)	4.8(-6)	4.1(-6)	2.2(-5)	4.7(-6)	4.8(-6)	4.5(-6)
[Mg VII]	5.5	3.3(-6)	3.3(-6)	3.4(-6)	7.5(-6)	3.3(-6)	3.3(-6)	3.4(-6)	2.8(-6)	1.5(-5)	3.3(-6)	3.4(-6)	3.2(-6)
[Mg V]	5.6	2.1(-3)	2.1(-3)	2.1(-3)	7.8(-5)	2.3(-3)	2.2(-3)	2.1(-3)	2.1(-3)	4.2(-3)	2.2(-3)	2.1(-3)	4.(-3)
[Ne VI]	7.6	5.6(-6)	5.6(-6)	5.8(-6)	1.3(-5)	5.7(-6)	5.6(-6)	5.8(-6)	4.5(-6)	2.6(-5)	5.7(-6)	6.1(-6)	1.1(-4)
[Ar III]	8.99	0.18	0.18	0.18	0.083	0.18	0.18	0.18	0.24	0.22	0.18	0.18	0.25
[S IV]	10.54	0.093	0.093	0.09	5.6(-3)	0.095	0.093	0.091	0.1	0.14	0.094	0.092	0.15
[Ne II]	12.8	0.42	0.42	0.41	0.25	0.42	0.42	0.41	0.34	0.45	0.42	0.4	0.16
[Ne V]	14.32	1.8(-6)	1.8(-6)	1.9(-6)	4.1(-6)	1.8(-6)	1.8(-6)	1.9(-6)	6.8(-7)	8.4(-6)	4.(-6)	4.9(-4)	0.033
[Ne III]	15.55	0.046	0.046	0.046	0.022	0.046	0.048	0.075	0.51	0.11	0.049	0.08	1.04
[S III]	18.7	0.15	0.15	0.156	0.15	0.15	0.15	0.156	0.18	0.2	0.15	0.157	0.20
[Ne V]	24.3	2.2(-6)	2.2(-6)	2.2(-6)	4.9(-6)	2.2(-6)	2.2(-6)	2.2(-6)	9.(-7)	1.(-5)	3.(-6)	1.9(-4)	0.013
[O IV]	25.9	1.7(-3)	1.7(-3)	1.7(-3)	2.4(-3)	1.7(-3)	1.7(-3)	1.7(-3)	4.5(-5)	7.9(-3)	2.3(-3)	0.0145	0.18
[Fe II]	26.	0.019	0.019	0.025	0.15	0.019	0.019	0.025	9.3(-3)	9.(-3)	0.019	0.024	4.5(-3)
[S III]	33.5	0.03	0.03	0.033	0.031	0.031	0.03	0.033	0.035	0.042	0.03	0.033	0.04
[Si II]	34.86	0.06	0.06	0.065	0.11	0.059	0.06	0.064	0.027	0.035	0.06	0.06	0.018
[Ne III]	36.01	3.(-3)	3.(-3)	3.(-3)	1.4(-3)	3.(-3)	3.1(-3)	4.9(-3)	0.034	7.2(-3)	3.3(-3)	5.3(-3)	0.07
[O III]	51.81	0.18	0.18	0.18	0.013	0.18	0.18	0.19	0.34	0.74	0.18	0.19	0.655
[O I]	63.18	1.1(-5)	1.1(-5)	3.9(-3)	0.036	1.1(-5)	1.1(-5)	3.5(-3)	7.5(-5)	4.8(-4)	1.1(-5)	3.(-3)	2.3(-6)
[O III]	88.36	0.024	0.024	0.023	1.8(-3)	0.024	0.024	0.025	0.043	0.097	0.024	0.0255	0.084
[O I]	145.5	4.(-7)	4.(-7)	1.8(-4)	1.5(-3)	4.(-7)	4.(-7)	1.6(-4)	2.5(-6)	2.(-5)	4.(-7)	1.4(-4)	7.8(-8)
[C II]	157.7	9.3(-5)	9.6(-5)	3.4(-4)	3.5(-3)	9.3(-5)	9.5(-5)	2.7(-4)	2.9(-4)	2.1(-5)	9.5(-5)	2.5(-4)	5.5(-5)

* $erg\,cm^{-2}s^{-1}$

Table 4

The models : V_s=500 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
T_*(K)		1(4)	...	...	...	5(4)	...	...	...	1(5)	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	1.4(-3)	1.4(-3)	1.5(-3)	1.5(-3)	1.4(-3)	1.4(-3)	1.5(-3)	1.6(-3)	1.4(-3)	1.4(-3)	1.5(-3)	1.6(-3)
Si III	1206	7.(-4)	7.(-4)	7.(-4)	1.1(-5)	7.(-4)	7.(-4)	7.2(-4)	7.8(-4)	7.(-4)	7.1(-4)	9.4(-4)	4.4(-3)
H I	1216	29.0	29.05	29.0	29.0	29.05	29.0	29.0	29.0	29.0	29.0	29.0	29.0
N V	1240	4.6(-5)	4.6(-5)	4.6(-5)	4.8(-5)	4.6(-5)	4.6(-5)	4.6(-5)	5.(-5)	4.6(-5)	4.6(-6)	5.4(-5)	1.7(-3)
S II	1256	8.4(-5)	8.4(-5)	8.4(-5)	8.8(-5)	8.3(-5)	8.4(-5)	8.6(-5)	9.6(-5)	8.3(-5)	8.5(-5)	1.(-4)	3.7(-4)
Si II	1264	2.5(-5)	2.5(-5)	2.4(-5)	2.6(-5)	2.4(-5)	2.4(-5)	2.5(-5)	2.9(-5)	2.4(-5)	2.5(-5)	3.(-5)	1.2(-4)
O I	1302+	1.4(-8)	1.4(-8)	1.4(-8)	2.8(-8)	1.4(-8)	1.4(-8)	1.4(-8)	2.4(-8)	1.4(-8)	1.4(-8)	1.4(-8)	1.6(-8)
Si IV	1397	1.(-3)	1.(-3)	1.(-3)	1.(-3)	1.(-3)	1.(-3)	1.(-3)	1.17(-3)	1.(-3)	1.(-3)	1.3(-3)	4.3(-3)
O IV	1401+	7.5(-3)	7.(-3)	7.5(-3)	7.4(-4)	7.(-3)	7.(-3)	7.(-3)	7.5(-3)	7.5(-3)	7.5(-3)	7.(-3)	0.0165
N IV]	1486	7.(-3)	7.(-3)	6.(-3)	6.(-3)	6.(-3)	6.(-3)	6.(-3)	6.5(-3)	6.(-3)	6.(-3)	6.6(-3)	0.025
C IV	1550	0.083	0.083	0.082	0.082	0.082	0.082	0.082	0.085	0.082	0.082	0.092	0.26
He II	1640	6.5	6.5	6.03	5.52	6.52	6.47	6.0	5.67	6.5	6.5	6.05	5.79
Si III	1892+	0.038	0.038	0.038	0.039	0.038	0.038	0.04	0.044	0.038	0.038	0.043	0.1
[Ne V]	3426	4.9(-5)	5.(-5)	5.(-5)	5.2(-5)	5.(-5)	5.(-5)	5.(-5)	5.4(-5)	5.(-5)	5.(-5)	6.6(-5)	2.7(-3)
[O II]	3727	5.5(-4)	5.6(-4)	0.02	0.046	5.5(-4)	5.7(-4)	0.017	0.056	5.5(-4)	5.8(-4)	0.013	0.048
[Ne III]	3869+	0.24	0.24	0.23	0.22	0.23	0.23	0.23	0.26	0.23	0.23	0.24	0.36
[S II]	4073+	0.026	0.027	0.027	0.028	0.026	0.026	0.026	0.03	0.026	0.026	0.026	0.037
[O III]	4363	3.2(-3)	3.1(-3)	3.1(-3)	3.(-3)	3.1(-3)	3.2(-3)	3.4(-3)	5.(-3)	3.1(-3)	3.3(-3)	4.6(-3)	0.018
He II	4686	1.05	1.04	0.97	0.88	1.05	1.04	0.97	0.91	1.05	1.04	0.97	0.93
[O III]	5007+	1.66	1.67	1.66	1.61	1.65	1.67	1.75	2.3	1.66	1.68	1.86	3.74
[N I]	5200+	3.(-8)	2.7(-8)	7.(-8)	8.3(-8)	2.7(-9)	2.7(-8)	7.5(-8)	2.3(-7)	2.7(-8)	2.7(-8)	6.8(-8)	7.5(-8)
He I	5876	0.031	0.032	0.038	0.04	0.031	0.032	0.039	0.047	0.031	0.032	0.039	0.044
[Fe VII]	6087	2.2(-3)	2.2(-3)	2.3(-3)	2.3(-3)	2.2(-3)	2.2(-3)	2.3(-3)	2.7(-3)	2.2(-3)	2.2(-3)	2.4(-3)	4.(-3)
[O I]	6300+	1.3(-6)	1.3(-6)	2.5(-6)	1.3(-4)	1.3(-6)	1.3(-6)	2.1(-6)	2.2(-5)	1.3(-6)	1.3(-6)	1.9(-6)	3.(-6)
[Fe X]	6374	4.9(-6)	4.9(-6)	4.9(-6)	5.1(-6)	5.(-6)	4.9(-6)	4.9(-6)	5.3(-6)	4.8(-6)	4.9(-6)	4.9(-6)	5.4(-6)
[N II]	6548+	1.(-3)	1.1(-3)	0.041	0.098	1.(-3)	1.1(-3)	0.031	0.1	1.(-3)	1.1(-3)	0.026	0.042
[S II]	6716	0.015	0.015	0.016	0.016	0.015	0.015	0.016	0.017	0.015	0.015	0.016	0.018
[S II]	6731	0.033	0.033	0.034	0.036	0.033	0.033	0.034	0.037	0.033	0.033	0.034	0.039
[O II]	7325	6.5(-5)	6.5(-5)	2.4(-3)	6.2(-3)	6.4(-5)	6.8(-5)	2.2(-3)	8.8(-3)	6.5(-5)	7.2(-5)	1.6(-3)	8.7(-3)
[Fe XI]	7892	1.3(-6)	1.3(-6)	1.3(-6)	1.4(-6)	1.3(-6)	1.3(-6)	1.4(-6)	1.5(-6)	1.3(-6)	1.3(-6)	1.4(-6)	1.5(-6)
Hβ		643.8	643.2	635.3	608.7	644.2	643.3	634.8	591.4	644.	643.3	634.	579.6
[S III]	9532+	0.55	0.55	0.56	0.59	0.55	0.55	0.56	0.61	0.55	0.55	0.56	0.644
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	8.3(-8)	0.0	0.0	0.0	7.3(-8)	0.0
[S VIII]	9913	3.4(-5)	3.4(-5)	3.4(-5)	3.4(-5)	3.4(-5)	3.4(-5)	3.5(-5)	4.(-5)	3.4(-5)	3.4(-5)	3.6(-5)	5.5(-5)
[S IX]	1.25	7.1(-7)	7.1(-7)	7.2(-7)	7.5(-7)	7.1(-7)	7.2(-7)	7.2(-7)	7.8(-7)	7.1(-7)	7.1(-7)	7.3(-7)	8.5(-7)
[Si VI]	1.96	7.7(-3)	7.7(-3)	7.6(-3)	7.5(-3)	7.6(-3)	7.7(-3)	7.7(-3)	8.6(-3)	7.7(-3)	7.7(-3)	7.8(-3)	0.01
[Si VII]	2.48	3.3(-4)	3.3(-4)	3.3(-4)	3.2(-4)	3.3(-4)	3.3(-4)	3.3(-4)	3.8(-4)	3.3(-4)	3.3(-4)	3.4(-4)	4.7(-4)
[Si IX]	2.59	3.9(-6)	3.9(-6)	4.(-6)	4.1(-6)	3.9(-6)	3.9(-6)	4.(-6)	4.3(-6)	3.9(-6)	3.9(-6)	4.(-6)	4.4(-6)
[Mg VIII]	3.03	2.3(-6)	2.3(-6)	2.4(-6)	2.4(-6)	2.3(-6)	2.3(-6)	2.4(-6)	2.7(-6)	2.3(-6)	2.3(-6)	2.5(-6)	3.4(-6)
[Si IX]	3.9	7.3(-6)	7.3(-6)	7.4(-6)	7.7(-6)	7.3(-6)	7.3(-6)	7.4(-6)	8.(-6)	7.3(-6)	7.3(-6)	7.4(-6)	8.2(-6)
[Mg VII]	5.5	2.1(-4)	2.1(-4)	2.1(-4)	2.0(-4)	2.1(-4)	2.1(-4)	2.1(-4)	2.3(-4)	2.1(-4)	2.1(-4)	2.2(-4)	2.9(-4)
[Mg V]	5.6	0.098	0.098	0.097	0.093	0.098	0.1	0.098	0.1	0.098	0.098	0.098	0.11
[Ne VI]	7.6	3.(-5)	3.(-5)	3.(-5)	3.2(-5)	3.(-5)	3.(-5)	3.(-5)	3.3(-5)	3.(-5)	3.(-5)	3.(-5)	4.3(-5)
[Ar III]	8.99	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.144	0.14	0.14	0.14	0.14
[S IV]	10.54	0.67	0.67	0.67	0.64	0.67	0.67	0.67	0.7	0.67	0.67	0.67	0.73
[Ne II]	12.8	0.016	0.018	0.046	0.071	0.016	0.018	0.043	0.043	0.016	0.018	0.042	0.039
[Ne V]	14.32	3.2(-5)	3.2(-5)	3.3(-5)	3.4(-5)	3.2(-5)	3.2(-5)	3.3(-5)	3.5(-5)	3.2(-5)	3.2(-5)	6.5(-5)	3.9(-3)
[Ne III]	15.55	1.08	1.07	1.01	0.94	1.08	1.07	1.0	1.04	1.08	1.07	1.02	1.06
[S III]	18.7	0.12	0.12	0.12	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
[Ne V]	24.3	1.2(-5)	1.2(-5)	1.2(-5)	1.3(-5)	1.2(-5)	1.2(-5)	1.2(-5)	1.3(-5)	1.2(-5)	1.2(-5)	2.2(-5)	1.2(-3)
[O IV]	25.9	2.08	2.07	1.96	1.83	2.08	2.07	1.96	1.88	2.08	2.07	1.96	1.95
[Fe II]	26.	5.2(-4)	5.2(-4)	5.1(-4)	1.0(-3)	5.2(-4)	5.2(-4)	5.1(-4)	5.(-4)	5.2(-4)	5.2(-4)	5.1(-4)	4.6(-4)
[S III]	33.5	0.0167	0.0167	0.0173	0.0186	0.017	0.017	0.017	0.0176	0.0167	0.0167	0.017	0.017
[Si II]	34.86	0.011	0.011	0.011	0.012	0.011	0.011	0.011	0.01	0.011	0.011	0.01	9.8(-3)
[Ne III]	36.01	0.059	0.058	0.055	0.051	0.059	0.058	0.055	0.057	0.059	0.058	0.056	0.059
[O III]	51.81	0.158	0.159	0.159	0.15	0.158	0.16	0.16	0.166	0.16	0.16	0.16	0.18
[O I]	63.18	4.1(-8)	4.1(-8)	2.4(-7)	3.6(-5)	4.1(-8)	4.(-8)	1.8(-7)	1.9(-6)	4.1(-8)	4.1(-8)	1.6(-7)	1.7(-7)
[O III]	88.36	0.018	0.018	0.018	0.017	0.018	0.018	0.0183	0.019	0.018	0.018	0.018	0.021
[O I]	145.5	1.2(-9)	1.2(-9)	7.5(-9)	1.2(-6)	1.2(-9)	1.2(-9)	5.8(-9)	6.(-8)	1.2(-9)	1.2(-9)	5.1(-9)	5.4(-9)
[C II]	157.7	2.6(-6)	2.6(-6)	4.7(-5)	1.6(-4)	2.6(-6)	2.6(-6)	3.6(-5)	3.9(-5)	2.6(-6)	2.6(-6)	3.1(-5)	1.3(-5)

* erg $cm^{-2}s^{-1}$

Table 5

The models : V_s=100 $km\,s^{-1}$, n_0=100 cm^{-3}, D= 10^{17}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	2.(-4)	2.4(-4)	7.7(-5)	9.(-5)	1.7(-4)	2.(-4)	5.9(-5)	7.8(-5)	0.0022	0.46	23.28	38.5
Si III	1206	0.155	0.043	2.7(-5)	8.6(-7)	0.148	0.0778	3.9(-5)	2.(-5)	0.081	0.0136	1.3(-4)	0.0
H I	1216	23.97	23.7	23.64	23.63	23.94	23.82	23.83	23.81	24.2	23.92	24.29	24.0
N V	1240	0.033	0.043	0.011	0.0145	0.029	0.034	0.0074	0.01	0.047	0.62	5.28	3.25
S II	1256	0.006	0.0014	1.6(-6)	3.3(-8)	0.0068	0.0015	2.7(-6)	4.2(-7)	0.0082	0.0016	0.0	0.0
Si II	1264	0.003	5.(-4)	9.4(-9)	0.0	0.0027	8.3(-4)	6.6(-8)	0.0	0.0034	1.4(-4)	0.0	0.0
O I	1302+	8.(-5)	6.5(-6)	0.0	0.0	1.5(-4)	1.9(-5)	0.0	0.0	8.8(-5)	3.1(-6)	0.0	0.0
Si IV	1397	0.11	0.077	0.002	3.2(-4)	0.1	0.092	7.4(-4)	8.3(-4)	0.068	0.164	0.005	0.0
O IV	1401+	0.25	0.3	0.042	0.048	0.21	0.25	0.0324	0.043	0.3	2.19	10.9	0.018
N IV]	1486	0.15	0.25	0.036	0.047	0.12	0.152	0.0174	0.024	0.2	1.36	1.2	0.073
C IV	1550	0.93	1.8	0.177	0.237	0.745	0.866	0.0387	0.051	1.3	10.45	14.9	5.0
He II	1640	0.0035	0.0037	0.01	0.115	0.003	0.0022	3.1(-4)	2.2(-4)	1.62	7.14	8.07	8.49
Si III	1892+	0.18	0.046	0.0013	1.7(-5)	0.12	0.044	0.0015	1.5(-4)	0.38	0.127	3.5(-4)	0.0
[Ne V]	3426	3.(-4)	3.8(-4)	8.9(-5)	1.(-4)	2.7(-4)	3.2(-4)	6.8(-5)	9.1(-5)	0.004	1.78	5.16	0.28
[O II]	3727	1.73	0.075	0.0072	7.7(-4)	2.	0.163	0.01	0.0012	2.8	0.07	0.0	0.0
[Ne III]	3869+	0.54	0.47	0.564	0.617	0.063	0.126	0.114	0.134	1.26	0.66	0.006	0.0
[S II]	4073+	0.02	1.6(-5)	3.0(-7)	0.0	0.017	4.5(-4)	5.(-6)	8.(-9)	0.033	1.(-4)	0.0	0.0
[O III]	4363	0.05	0.048	0.029	0.034	0.021	0.023	0.0026	0.0033	0.133	0.20	0.005	0.0
He II	4686	3.9(-4)	3.9(-4)	0.0016	0.0179	3.3(-4)	2.(-4)	4.(-5)	2.2(-5)	0.244	1.01	1.05	1.0
[O III]	5007+	9.54	10.5	12.42	13.3	2.24	4.07	3.45	3.86	20.9	14.45	0.167	0.0
[N I]	5200+	2.7(-4)	1.3(-6)	0.0	0.0	4.5(-4)	3.2(-6)	0.0	0.0	2.8(-4)	2.4(-7)	0.0	0.0
He I	5876	0.15	0.147	0.145	0.142	0.154	0.158	0.161	0.16	0.11	0.0125	8.6(-4)	7.2(-5)
[Fe VII]	6087	3.2(-5)	3.9(-5)	8.(-6)	9.4(-6)	2.8(-5)	3.2(-5)	6.2(-6)	8.2(-6)	0.0014	0.77	0.26	6.6(-4)
[O I]	6300+	0.0055	7.7(-6)	0.0	0.0	0.0054	2.2(-5)	0.0	0.0	0.0084	1.2(-6)	0.0	0.0
[S III]	6312	0.025	0.003	6.6(-5)	1.3(-6)	0.012	0.005	4.8(-4)	5.3(-5)	0.054	0.002	2.2(-6)	0.0
[Fe X]	6374	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8(-4)	0.25	0.82
[N II]	6548+	0.88	0.023	5.3(-4)	6.2(-6)	1.3	0.075	0.0059	4.8(-4)	1.17	0.02	0.0	0.0
[S II]	6716	0.145	.00103	2.2(-6)	2.1(-9)	0.17	0.0047	6.3(-5)	2.7(-8)	0.21	3.6(-4)	0.0	0.0
[S II]	6731	0.153	.00107	2.3(-6)	1.6(-9)	0.18	0.0051	6.8(-5)	2.1(-8)	0.22	3.4(-4)	0.0	0.0
[O II]	7325	0.043	0.0024	1.4(-4)	1.6(-5)	0.048	0.0052	1.1(-4)	1.4(-5)	0.085	0.0036	0.0	0.0
[Fe XI]	7892	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2(-6)	0.026	0.97
Hβ	$erg\,cm^{-2}s^{-1}$	0.0058	0.0048	0.0046	0.004	0.0066	0.0057	0.006	0.0046	0.005	0.0034	0.0022	0.0012
[S III]	9532+	2.65	0.29	0.007	8.6(-5)	1.9	1.0	0.14	0.0136	3.43	0.049	4.(-5)	0.0
[C I]	9850	5.(-5)	5.5(-7)	0.0	0.0	7.5(-5)	5.6(-6)	0.0	0.0	6.5(-5)	1.7(-7)	0.0	0.0
[S VIII]	9913	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.(-6)	0.0037	0.26	0.72
[S IX]	1.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7(-9)	9.4(-6)	0.007	0.25
[Si VI]	1.96	5.2(-7)	6.4(-7)	1.7(-7)	2.(-7)	4.6(-7)	5.3(-7)	1.3(-7)	1.7(-7)	0.0026	0.39	0.233	0.0018
[Si VII]	2.48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8(-5)	0.077	0.617	0.063
[Si IX]	2.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8(-4)	0.273	4.94
[Mg VIII]	3.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9(-8)	0.0045	0.634	1.16
[Si IX]	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2(-4)	0.6	10.3
[Mg VII]	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.(-5)	0.157	1.6	0.223
[Mg V]	5.6	9.2(-6)	1.1(-5)	2.7(-6)	3.2(-6)	8.(-6)	9.4(-6)	2.1(-6)	2.8(-6)	0.0035	0.68	0.032	2.5(-5)
[Ne VI]	7.6	5.8(-8)	7.(-8)	2.(-8)	2.4(-8)	5.(-8)	5.9(-8)	1.6(-8)	2.1(-8)	1.4(-4)	0.45	6.55	2.52
[Ar III]	8.99	0.36	0.058	0.0049	4.8(-4)	0.33	0.3	0.108	0.0146	0.37	0.0046	1.8(-7)	0.0
[S IV]	10.54	0.54	3.59	1.11	0.133	0.047	2.0	3.788	3.64	1.21	0.93	0.0057	0.0
[Ne II]	12.8	0.056	0.0056	5.6(-4)	5.6(-5)	0.42	0.145	0.019	0.002	0.024	3.1(-4)	0.0	0.0
[Ne V]	14.32	2.7(-5)	3.3(-5)	7.3(-6)	8.5(-6)	2.3(-5)	2.7(-5)	5.6(-6)	7.4(-6)	0.024	5.0	4.14	0.10
[Ne III]	15.55	1.54	1.67	1.72	1.74	0.26	1.07	1.44	1.51	1.7	0.31	0.0012	0.0
[S III]	18.7	1.0	0.12	0.0026	3.(-5)	0.94	0.59	0.092	0.0084	0.96	0.0082	5.(-6)	0.0
[Ne V]	24.3	3.5(-5)	4.4(-5)	1.(-5)	1.1(-5)	3.1(-5)	3.6(-5)	7.4(-6)	1.(-5)	0.023	5.04	4.41	0.11
[O IV]	25.9	0.01	0.014	0.016	0.177	0.0086	0.01	0.0014	0.0016	0.99	21.0	1.93	0.006
[Fe II]	26.	0.036	7.7(-6)	0.0	0.0	0.137	1.(-4)	5.8(-7)	0.0	0.022	0.0	0.0	0.0
[S III]	33.5	1.03	0.12	0.0027	3.1(-5)	0.96	0.58	0.09	0.008	1.0	0.009	5.8(-6)	0.0
[Si II]	34.86	0.75	0.0134	3.4(-5)	0.0	0.82	0.0367	8.5(-4)	6.4(-6)	0.5	0.0012	0.0	0.0
[Ne III]	36.01	0.132	0.144	0.148	0.15	0.0225	0.091	0.122	0.129	0.148	0.0277	1.1(-4)	0.0
[O III]	51.81	2.97	3.79	3.93	3.95	1.166	3.165	3.344	3.41	3.52	1.04	0.0059	0.0
[O I]	63.18	0.0027	3.(-6)	0.0	0.0	0.0044	1.6(-5)	0.0	0.0	0.0025	3.6(-8)	0.0	0.0
[O III]	88.36	1.43	1.78	1.87	1.87	0.54	1.42	1.484	1.52	1.755	0.54	0.0034	0.0
[O I]	145.5	1.8(-4)	2.(-7)	0.0	0.0	3.(-4)	1.1(-6)	0.0	0.0	1.6(-4)	2.(-9)	0.0	0.0
[C II]	157.7	0.013	8.5(-4)	1.9(-5)	2.2(-7)	0.027	3.3(-3)	3.4(-4)	2.9(-5)	0.012	2.2(-4)	6.2(-7)	0.0

Table 5 (continued)

The models : V_s=100 km s^{-1}, n_0=100 cm^{-3}, D= 10^{17}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	0.02	7.03	41.2	25.63	0.32	19.4	40.25	15.95
Si III	1206	0.03	0.0026	0.0	0.0	0.0167	2.4(-4)	0.0	0.0
H I	1216	23.8	24.33	24.14	24.	23.9	24.3	24.06	24.
N V	1240	0.109	3.44	4.64	1.81	0.51	5.17	3.53	1.04
S II	1256	0.0034	1.8(-5)	0.0	0.0	0.0024	0.0	0.0	0.0
Si II	1264	7.(-4)	1.7(-5)	0.0	0.0	2.(-4)	0.0	0.0	0.0
O I	1302+	1.9(-5)	0.0	0.0	0.0	5.8(-6)	0.0	0.0	0.0
Si IV	1397	0.129	0.058	0.0	0.0	0.17	0.0085	0.0	0.0
O IV	1401+	0.57	3.6	0.17	0.001	2.	1.8	0.027	0.0
N IV]	1486	0.45	2.4	0.3	0.011	1.27	1.35	0.085	0.0022
C IV	1550	3.5	18.73	9.0	1.99	9.3	15.9	5.64	0.76
He II	1640	4.78	7.83	8.28	8.78	6.96	8.0	8.45	9.0
Si III	1892+	0.389	0.017	0.0	0.0	0.165	7.(-4)	0.0	0.0
[Ne V]	3426	0.17	5.54	1.99	0.006	1.34	5.5	0.44	2.2(-4)
[O II]	3727	0.49	0.0031	0.0	0.0	0.1	8.7(-8)	0.0	0.0
[Ne III]	3869+	1.49	0.086	1.5(-4)	0.0	0.8	0.01	0.0	0.0
[S II]	4073+	0.0019	4.5(-7)	0.0	0.0	1.9(-4)	0.0	0.0	0.0
[O III]	4363	0.25	0.057	1.2(-4)	0.0	0.22	0.008	0.0	0.0
He II	4686	0.70	1.06	1.02	0.97	0.997	1.05	1.0	0.96
[O III]	5007+	28.76	2.49	0.0032	0.0	16.83	0.286	0.0	0.0
[N I]	5200+	1.5(-5)	0.0	0.0	0.0	4.(-7)	0.0	0.0	0.0
He I	5876	0.052	0.0029	2.3(-4)	2.(-5)	0.015	0.001	8.9(-5)	8.7(-6)
[Fe VII]	6087	0.12	0.89	0.018	4.(-8)	0.653	0.35	0.0012	0.0
[O I]	6300+	1.3(-4)	0.0	0.0	0.0	2.3(-6)	0.0	0.0	0.0
[Fe X]	6374	1.1(-6)	0.023	0.94	0.19	1.2(-4)	0.18	0.92	0.033
[N II]	6548+	0.149	9.1(-4)	0.0	0.0	0.029	4.9(-5)	0.0	0.0
[S II]	6716	0.0092	1.4(-6)	0.0	0.0	6.7(-4)	0.0	0.0	0.0
[S II]	6731	0.0095	1.2(-6)	0.0	0.0	6.4(-4)	0.0	0.0	0.0
[O II]	7325	0.019	2.(-4)	0.0	0.0	0.005	8.6(-9)	0.0	0.0
[Fe XI]	7892	0.0	7.4(-4)	0.37	0.63	1.(-7)	0.015	0.9	0.21
Hβ	erg $cm^{-2}s^{-1}$	0.0045	0.0028	0.0016	0.0015	0.003	0.0024	0.0014	2.(-5)
[S III]	9532+	0.78	0.001	0.0	0.0	0.085	7.(-5)	0.0	0.0
[C I]	9850	1.9(-6)	0.0	0.0	0.0	4.(-7)	0.0	0.0	0.0
[S VIII]	9913	1.1(-4)	0.061	0.61	0.46	0.0022	0.22	0.72	0.2
[S IX]	1.25	6.6(-8)	5.5(-4)	0.065	0.63	4.8(-6)	0.005	0.21	0.74
[Si VI]	1.96	0.0917	0.54	0.029	3.3(-5)	0.335	0.289	0.003	1.7(-8)
[Si VII]	2.48	0.0052	0.43	0.3	0.0044	0.053	0.62	0.087	4.5(-4)
[Si IX]	2.59	3.9(-7)	0.017	2.07	5.34	8.(-5)	0.18	4.5	3.58
[Mg VIII]	3.03	4.7(-5)	0.12	1.46	0.34	0.0024	0.5	1.29	0.09
[Si IX]	3.9	7.8(-7)	0.038	4.4	10.87	1.9(-4)	0.4	9.42	7.22
[Mg VII]	5.5	0.0055	0.98	0.94	0.017	0.1	1.57	0.3	0.0018
[Mg V]	5.6	0.32	0.227	0.0012	0.0	0.7	0.047	5.(-5)	0.0
[Ne VI]	7.6	0.022	3.0	7.02	0.16	0.3	6.	3.3	0.0135
[Ar III]	8.99	0.1	6.8(-5)	1.2(-9)	0.0	0.0088	2.8(-7)	0.0	0.0
[S IV]	10.54	3.53	0.07	2.2(-4)	0.0	1.3	0.009	1.4(-5)	0.0
[Ne II]	12.8	0.0043	5.6(-6)	0.0	0.0	5.(-4)	0.0	0.0	0.0
[Ne V]	14.32	0.92	7.0	1.02	0.0015	4.25	4.74	0.16	4.7(-5)
[Ne III]	15.55	1.21	0.023	2.1(-5)	0.0	0.42	0.002	0.0	0.0
[S III]	18.7	0.176	1.4(-4)	0.0	0.0	0.015	9.(-6)	0.0	0.0
[Ne V]	24.3	0.9	7.3	1.11	0.0017	4.26	5.	0.184	5.5(-5)
[O IV]	25.9	9.96	10.76	0.11	2.1(-4)	20.7	2.79	0.01	0.0
[Fe II]	26.	1.6(-5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S III]	33.5	0.186	1.6(-4)	0.0	0.0	0.016	1.(-5)	0.0	0.0
[Si II]	34.86	0.026	2.3(-5)	0.0	0.0	0.002	0.0	0.0	0.0
[Ne III]	36.01	0.106	0.002	1.9(-6)	0.0	0.037	1.8(-4)	0.0	0.0
[O III]	51.81	3.2	0.112	9.(-5)	0.0	1.3	0.01	0.0	0.0
[O I]	63.18	2.6(-5)	0.0	0.0	0.0	7.(-8)	0.0	0.0	0.0
[O III]	88.36	1.61	0.062	5.3(-5)	0.0	0.67	0.006	0.0	0.0
[O I]	145.5	1.6(-6)	0.0	0.0	0.0	3.8(-9)	0.0	0.0	0.0
[C II]	157.7	0.0022	1.(-5)	0.0	0.0	3.3(-4)	1.(-6)	0.0	0.0

Table 6

The models : V_s=100 km s^{-1}, n_0=100 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	7.2(-5)	1.(-5)	1.8(-5)	7.7(-7)	7.1(-5)	9.8(-6)	1.1(-5)	4.8(-7)	3.2(-4)	0.008	21.6	42.5
Si III	1206	0.066	0.0095	1.6(-4)	1.8(-7)	0.065	0.009	7.7(-4)	3.1(-7)	0.024	0.028	2.(-4)	0.0
H I	1216	25.1	23.9	23.63	23.63	25.25	23.9	23.8	23.83	83.1	106.	24.8	24.0
N V	1240	0.012	0.0016	0.0035	1.2(-4)	0.012	0.0016	0.0019	6.(-5)	0.0095	0.02	9.0	3.57
S II	1256	0.007	0.0023	1.2(-5)	0.0	0.0065	9.4(-4)	1.8(-5)	2.8(-9)	0.016	0.0149	1.3(-9)	0.0
Si II	1264	0.0019	6.3(-4)	7.7(-7)	0.0	0.0018	2.5(-4)	4.6(-6)	0.0	0.018	0.0296	0.0	0.0
O I	1302+	6.7(-4)	1.1(-4)	1.6(-8)	0.0	6.7(-4)	7.3(-5)	1.8(-7)	0.0	0.028	0.034	0.0	0.0
Si IV	1397	0.04	0.0055	0.0038	2.5(-4)	0.04	0.0056	0.0022	9.(-5)	0.016	0.163	0.0067	0.0
O IV	1401+	0.086	0.012	0.023	4.4(-4)	0.083	0.012	0.014	2.4(-4)	0.065	0.13	9.3	0.021
N IV]	1486	0.05	0.008	0.032	0.013	0.05	0.0074	0.0082	1.6(-4)	0.039	0.31	10.31	0.083
C IV	1550	0.31	0.062	0.264	0.18	0.3	0.042	0.046	4.8(-4)	0.226	3.48	104.6	5.45
He II	1640	8.4(-4)	1.1(-4)	1.8(-4)	7.2(-6)	8.3(-4)	0.0076	1.(-4)	9.4(-7)	1.55	3.2	7.06	8.5
Si III	1892+	0.063	0.075	0.003	1.9(-5)	0.057	0.016	0.0049	1.37(-4)	0.054	0.37	4.9(-4)	0.0
[Ne V]	3426	1.1(-4)	1.5(-5)	2.8(-5)	9.(-7)	1.1(-4)	1.5(-5)	1.7(-5)	5.5(-7)	2.7(-4)	0.136	6.07	0.28
[O II]	3727	2.6	1.0	0.007	8.(-4)	1.4	0.8	0.013	1.2(-3)	9.5	9.2	0.0072	0.0
[Ne III]	3869+	0.33	0.59	0.57	0.62	0.023	0.09	0.134	0.115	3.73	3.6	0.178	0.0
[S II]	4073+	0.16	0.23	1.8(-6)	0.0	0.08	0.088	4.(-5)	6.5(-8)	0.5	0.1	0.0	0.0
[O III]	4363	0.01	0.028	0.03	0.033	0.0066	0.0042	0.0035	2.(-3)	0.0157	0.34	0.49	0.0
He II	4686	7.5(-5)	1.(-5)	1.5(-5)	1.(-6)	7.4(-5)	1.(-5)	8.7(-6)	7.1(-8)	0.236	0.47	0.9	1.0
[O III]	5007+	2.21	10.95	12.52	13.5	0.43	3.48	3.97	3.43	3.27	30.88	14.8	0.0
[N I]	5200+	0.03	0.0034	0.0	0.0	0.025	0.0025	8.(-9)	0.0	0.11	0.0058	0.0	0.0
He I	5876	0.29	0.16	0.14	0.14	0.26	0.167	0.159	0.16	0.37	0.123	0.0169	6.5(-5)
[Fe VII]	6087	1.1(-5)	1.5(-6)	2.9(-6)	8.(-8)	1.1(-5)	1.6(-6)	1.8(-6)	5.(-8)	1.2(-4)	0.125	0.32	7.2(-4)
[O I]	6300+	0.66	0.11	6.(-9)	0.0	0.42	0.064	6.3(-8)	0.0	13.96	4.4	0.0	0.0
[S III]	6312	0.002	8.2(-4)	2.(-4)	8.8(-7)	0.0017	3.7(-4)	0.002	5.4(-5)	0.18	0.14	2.9(-5)	0.0
[Fe X]	6374	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2(-5)	0.28	0.85
[N II]	6548+	2.64	0.64	5.6(-4)	6.5(-6)	1.72	0.61	0.007	5.5(-4)	24.5	8.15	3.7(-4)	0.0
[S II]	6716	1.79	1.85	1.23(-5)	0.0	1.07	0.97	4.6(-4)	7.4(-7)	5.0	0.62	0.0	0.0
[S II]	6731	1.68	1.92	1.28(-5)	0.0	0.98	1.02	5.(-4)	8.(-7)	4.0	0.57	0.0	0.0
[O II]	7325	0.06	0.025	1.5(-4)	1.6(-5)	0.034	0.013	1.9(-4)	1.(-5)	0.21	0.29	5.3(-4)	0.0
[Fe XI]	7892	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3(-8)	0.031	0.99
Hβ	erg $cm^{-2}s^{-1}$	0.016	0.12	0.065	0.46	0.0164	0.12	0.1	0.75	0.022	0.159	0.247	0.056
[S III]	9532+	0.24	0.086	0.02	9.3(-5)	0.21	0.057	0.447	0.016	12.72	6.22	5.(-4)	0.0
[C I]	9850	1.8(-4)	3.(-5)	0.0	0.0	1.7(-4)	4.5(-5)	3.4(-9)	0.0	5.8(-4)	1.4(-4)	0.0	0.0
[S VIII]	9913	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3(-7)	5.7(-4)	0.274	0.73
[S IX]	1.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2(-6)	0.008	0.263
[Si VI]	1.96	1.9(-7)	2.5(-8)	4.8(-8)	1.7(-9)	1.7(-7)	2.6(-8)	3.(-8)	1.(-9)	2.(-4)	0.147	0.228	0.0018
[Si VII]	2.48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6(-6)	0.025	0.33	0.062
[Si IX]	2.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7(-5)	0.31	5.06
[Mg VIII]	3.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4(-9)	9.(-4)	0.686	1.17
[Si IX]	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2(-4)	0.677	10.5
[Mg VII]	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1(-6)	1.(-9)	1.65	0.22
[Mg V]	5.6	3.3(-6)	4.5(-7)	8.4(-7)	2.7(-8)	3.3(-6)	4.5(-7)	5.2(-7)	1.7(-8)	1.1(-4)	0.179	0.029	2.3(-5)
[Ne VI]	7.6	2.(-8)	2.8(-9)	5.3(-9)	0.0	2.(-8)	2.8(-9)	3.3(-9)	0.0	2.8(-6)	0.036	6.07	2.52
[Ar III]	8.99	0.043	0.036	0.007	5.(-4)	0.026	0.019	0.223	0.0167	0.35	0.48	1.2(-5)	0.0
[S IV]	10.54	0.001	1.8(-4)	2.1	0.14	0.001	1.8(-4)	3.22	4.08	0.036	1.20	0.045	0.0
[Ne II]	12.8	0.66	0.075	5.8(-4)	5.7(-5)	0.96	0.34	0.021	0.0022	0.63	0.042	2.9(-6)	0.0
[Ne V]	14.32	1.(-5)	1.3(-6)	2.5(-6)	7.3(-8)	9.5(-6)	1.3(-6)	1.5(-6)	4.5(-8)	4.8(-4)	0.48	4.28	0.097
[Ne III]	15.55	1.45	1.72	1.72	1.74	0.21	0.71	1.46	1.49	5.92	2.55	0.03	0.0
[S III]	18.7	0.47	0.074	0.008	3.4(-5)	0.46	0.071	0.27	0.01	3.41	1.32	6.(-5)	0.0
[Ne V]	24.3	1.3(-5)	1.7(-6)	3.3(-6)	1.(-7)	1.3(-5)	1.7(-6)	2.(-6)	6.(-8)	4.7(-4)	0.48	4.6	0.11
[O IV]	25.9	0.0035	5.6(-4)	0.0034	0.027	0.0035	4.8(-4)	5.6(-4)	9.(-6)	0.028	2.8	9.35	0.0063
[Fe II]	26.	2.44	0.42	0.0	0.0	2.33	0.43	5.5(-6)	0.0	3.44	0.78	0.0	0.0
[S III]	33.5	0.89	0.12	0.008	3.5(-5)	0.87	0.119	0.268	0.01	5.48	1.8	7.(-5)	0.0
[Si II]	34.86	11.3	1.8	1.7(-4)	0.0	10.9	1.86	0.0064	8.3(-6)	12.16	2.138	0.0	0.0
[Ne III]	36.01	0.125	0.14	0.15	0.15	0.0174	0.061	0.124	0.127	0.52	0.226	0.0027	0.0
[O III]	51.81	0.85	3.47	3.94	4.0	0.193	2.3	3.39	3.364	0.784	2.65	0.48	0.0
[O I]	63.18	4.18	0.47	0.0	0.0	4.08	0.48	1.7(-9)	0.0	7.33	1.162	0.0	0.0
[O III]	88.36	0.41	1.66	1.87	1.9	0.09	1.0	1.52	1.49	0.39	1.40	0.28	0.0
[O I]	145.5	0.36	0.041	0.0	0.0	0.36	0.042	0.0	0.0	0.64	0.089	0.0	0.0
[C II]	157.7	1.97	0.22	1.9(-5)	2.2(-7)	1.96	0.24	3.3(-4)	3.4(-5)	1.45	0.126	7.(-6)	0.0

Table 6 (continued)

The models : V_s=100 $km\,s^{-1}$, n_0=100 cm^{-3}, D= 10^{19}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	4.2(-4)	0.59	46.07	25.2	0.0015	14.4	44.76	15.9
Si III	1206	0.008	0.02	0.0	0.0	0.024	3.6(-4)	0.0	0.0
H I	1216	104.	33.12	24.	24.	108.2	24.97	24.	24.
N V	1240	0.004	1.09	5.17	1.8	0.011	7.35	3.89	1.04
S II	1256	0.013	0.0019	0.0	0.0	0.015	1.8(-8)	0.0	0.0
Si II	1264	0.026	0.0013	0.0	0.0	0.03	0.0	0.0	0.0
O I	1302+	0.036	1.2(-4)	0.0	0.0	0.036	0.0	0.0	0.0
Si IV	1397	0.026	0.178	0.0	0.0	0.129	0.011	0.0	0.0
O IV	1401+	0.026	2.83	0.2	0.0011	0.07	9.8	0.031	0.0
N IV]	1486	0.03	5.32	0.23	0.012	0.2	10.7	0.11	0.0032
C IV	1550	0.24	49.87	10.10	2.	2.19	105.9	6.19	0.77
He II	1640	2.32	4.35	8.3	8.77	3.06	6.66	8.5	9.0
Si III	1892+	0.174	0.11	0.0	0.0	0.36	0.001	0.0	0.0
[Ne V]	3426	0.0058	2.6	2.05	0.006	0.083	6.15	0.44	2.2(-4)
[O II]	3727	9.5	0.65	0.0	0.0	9.4	0.014	0.0	0.0
[Ne III]	3869+	3.45	2.58	1.5(-4)	0.0	3.6	0.32	0.0	0.0
[S II]	4073+	0.25	0.003	0.0	0.0	0.13	0.0	0.0	0.0
[O III]	4363	0.073	1.4	1.3(-4)	0.0	0.266	0.72	0.0	0.0
He II	4686	0.35	0.59	1.02	0.98	0.45	0.86	1.0	0.96
[O III]	5007+	13.17	67.22	0.0034	0.0	27.12	23.23	0.0	0.0
[N I]	5200+	0.025	1.2(-5)	0.0	0.0	0.075	0.0	0.0	0.0
He I	5876	0.21	0.054	2.2(-4)	2.(-5)	0.137	0.022	8.(-5)	8.4(-6)
[Fe VII]	6087	0.0015	0.84	0.02	0.0	0.072	0.42	0.0013	0.0
[O I]	6300+	8.04	0.0028	0.0	0.0	5.05	0.0	0.0	0.0
[Fe X]	6374	2.7(-9)	0.016	0.97	0.19	9.5(-6)	0.2	0.95	0.032
[N II]	6548+	13.94	0.14	0.0	0.0	9.13	6.7(-4)	0.0	0.0
[S II]	6716	1.93	0.0117	0.0	0.0	0.79	1.4(-9)	0.0	0.0
[S II]	6731	1.71	0.0119	0.0	0.0	0.73	1.2(-9)	0.0	0.0
[O II]	7325	0.25	0.036	0.0	0.0	0.29	0.001	0.0	0.0
[Fe XI]	7892	0.0	5.(-4)	0.386	0.63	0.0	0.018	0.93	0.21
Hβ	$erg\,cm^{-2}s^{-1}$	0.068	0.32	0.03	0.149	0.138	0.26	0.048	0.126
[S III]	9532+	9.13	0.38	0.0	0.0	6.87	7.5(-4)	0.0	0.0
[C I]	9850	3.2(-4)	6.7(-7)	0.0	0.0	1.7(-4)	0.0	0.0	0.0
[S VIII]	9913	4.2(-6)	0.038	0.62	0.46	2.6(-4)	0.22	0.74	0.2
[S IX]	1.25	3.9(-9)	3.2(-4)	0.068	0.63	4.3(-7)	0.0052	0.22	0.74
[Si VI]	1.96	0.011	0.5	0.0285	3.3(-5)	0.11	0.284	0.003	0.0
[Si VII]	2.48	5.(-4)	0.36	0.3	0.0045	0.0145	0.64	0.086	4.4(-4)
[Si IX]	2.59	2.9(-8)	0.013	2.14	5.33	1.7(-5)	0.2	4.63	3.57
[Mg VIII]	3.03	1.1(-6)	0.091	1.49	0.35	3.5(-4)	0.54	1.3	0.092
[Si IX]	3.9	5.7(-8)	0.03	4.55	10.85	4.3(-5)	0.45	9.65	7.18
[Mg VII]	5.5	1.3(-4)	0.79	0.94	0.017	0.016	1.61	0.3	0.0018
[Mg V]	5.6	0.0097	0.23	0.0011	0.0	0.136	0.045	4.9(-5)	0.0
[Ne VI]	7.6	8.2(-4)	1.22	7.06	0.16	0.02	5.28	3.33	0.0135
[Ar III]	8.99	0.51	0.05	0.0	0.0	0.51	2.6(-5)	0.0	0.0
[S IV]	10.54	0.41	0.85	6.4(-4)	0.0	1.12	0.065	2.(-5)	0.0
[Ne II]	12.8	0.15	5.7(-4)	0.0	0.0	0.053	7.2(-6)	0.0	0.0
[Ne V]	14.32	0.039	3.6	1.0	0.0015	0.337	4.76	0.16	4.7(-5)
[Ne III]	15.55	3.8	0.76	2.(-5)	0.0	2.77	0.059	0.0	0.0
[S III]	18.7	2.2	0.06	0.0	0.0	1.5	9.3(-5)	0.0	0.0
[Ne V]	24.3	0.039	3.75	1.1	0.0018	0.336	5.09	0.18	5.5(-5)
[O IV]	25.9	0.53	12.05	0.11	2.2(-4)	2.2	12.18	0.01	0.0
[Fe II]	26.	1.6	4.7(-4)	0.0	0.0	0.9	0.0	0.0	0.0
[S III]	33.5	3.2	0.067	0.0	0.0	2.05	1.1(-4)	0.0	0.0
[Si II]	34.86	5.11	0.0049	0.0	0.0	2.56	0.0	0.0	0.0
[Ne III]	36.01	0.34	0.067	1.9(-6)	0.0	0.24	0.0052	0.0	0.0
[O III]	51.81	2.06	3.3	9.3(-5)	0.0	2.56	0.8	0.0	0.0
[O I]	63.18	2.8	3.7(-4)	0.0	0.0	1.387	0.0	0.0	0.0
[O III]	88.36	1.05	1.84	5.6(-5)	0.0	1.35	0.46	0.0	0.0
[O I]	145.5	0.23	2.(-5)	0.0	0.0	0.11	0.0	0.0	0.0
[C II]	157.7	0.42	6.2(-4)	0.0	0.0	0.16	1.2(-5)	0.0	0.0

Table 7

The models : V_s=300 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{17}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	6.497	5.74	5.14	0.0016	5.44	4.79	4.47	0.0016	3.87	6.625	6.46	37.0
Si III	1206	4.(-6)	0.018	4.9(-4)	9.7(-6)	3.5(-6)	0.0016	1.6(-4)	3.7(-5)	6.5(-6)	0.07	0.0092	0.0
H I	1216	27.75	27.58	27.59	28.22	27.75	27.6	27.63	27.61	27.6	28.65	28.85	28.8
N V	1240	0.164	0.145	0.13	1.4(-4)	0.137	0.12	0.11	1.3(-4)	0.098	0.172	0.995	5.47
S II	1256	2.7(-6)	0.0054	3.9(-7)	0.0	2.6(-6)	9.6(-4)	6.3(-7)	5.3(-9)	6.8(-6)	0.0055	4.8(-6)	0.0
Si II	1264	9.4(-7)	5.3(-4)	3.6(-6)	4.5(-9)	8.4(-7)	6.9(-5)	1.6(-6)	2.4(-8)	1.4(-6)	0.0015	7.9(-5)	0.0
O I	1302+	2.4(-7)	1.4(-7)	2.2(-9)	0.0	2.(-7)	1.7(-7)	1.7(-9)	0.0	1.4(-7)	3.3(-7)	0.0	0.0
Si IV	1397	8.7(-4)	0.0057	0.011	0.0022	7.3(-4)	8.(-4)	0.0013	0.002	5.1(-4)	0.106	0.15	9.(-4)
O IV	1401+	0.03	0.027	0.022	2.3(-4)	0.0246	0.022	0.0184	2.3(-7)	0.017	0.055	3.2	0.64
N IV]	1486	0.0014	0.03	0.0112	0.022	0.0011	0.0094	8.7(-4)	3.(-4)	7.5(-4)	0.09	2.9	0.7
C IV	1550	0.136	0.174	0.247	0.307	0.114	0.10	0.093	0.0029	0.081	1.33	28.07	13.15
He II	1640	0.165	0.146	0.127	0.043	0.14	0.12	0.114	0.0069	0.125	0.55	6.6	8.2
Si III	1892+	0.0014	0.60	0.0408	7.4(-4)	0.0014	0.11	0.034	0.0066	0.0038	1.08	0.057	0.0
[Ne V]	3426	0.047	0.042	0.037	0.0	0.039	0.035	0.032	0.0	0.028	0.055	2.95	3.76
[O II]	3727	0.04	0.52	0.027	0.0022	0.037	0.3	0.085	0.0063	0.062	0.61	0.036	0.0
[Ne III]	3869+	0.0115	1.10	0.75	0.74	0.010	0.05	0.27	0.32	0.017	2.52	1.03	0.0012
[S II]	4073+	0.068	0.4	1.2(-4)	0.0	0.07	0.32	0.001	8.4(-6)	0.1	0.1	1.6(-5)	0.0
[O III]	4363	9.(-4)	0.116	0.048	0.05	9.1(-4)	0.025	0.012	0.012	0.0019	0.4	0.57	0.001
He II	4686	0.025	0.02	0.018	0.0057	0.021	0.018	0.0167	0.001	0.0188	0.078	0.91	1.04
[O III]	5007+	2.0	22.0	15.43	14.89	2.06	9.6	7.66	7.88	2.94	42.1	30.89	0.03
[N I]	5200+	4.4(-6)	1.9(-6)	0.0	0.0	2.5(-4)	1.3(-6)	4.7(-7)	0.0	2.6(-6)	1.4(-6)	0.0	0.0
He I	5876	0.16	0.145	0.145	0.18	0.164	0.149	0.15	0.15	0.159	0.14	0.03	9.1(-4)
[Fe VII]	6087	0.023	0.020	0.019	2.1(-5)	0.02	0.017	0.016	1.1(-5)	0.014	0.039	1.02	0.087
[O I]	6300+	1.7(-4)	1.2(-4)	3.(-6)	0.0	1.4(-4)	1.4(-4)	1.3(-5)	0.0	1.0(-4)	7.(-5)	0.0	0.0
[S III]	6312	8.1(-4)	0.033	0.002	2.6(-5)	8.2(-4)	0.0083	0.0073	7.4(-4)	0.0014	0.037	6.1(-4)	0.0
[Fe X]	6374	0.0075	0.0067	0.006	4.3(-5)	0.0063	0.0056	0.0053	4.1(-5)	0.0045	0.008	0.013	0.58
[N II]	6548+	0.057	0.285	0.014	1.7(-4)	0.052	0.175	0.077	0.0053	0.071	0.31	0.011	0.0
[S II]	6716	0.097	0.26	9.1(-5)	0.0	0.097	0.27	9.2(-4)	8.(-6)	0.12	0.056	7.1(-6)	0.0
[S II]	6731	0.2	0.054	1.9(-4)	0.0	0.20	0.56	0.0019	1.6(-5)	0.24	0.115	1.5(-5)	0.0
[O II]	7325	0.002	0.08	0.003	2.7(-4)	0.0019	0.032	0.0077	5.5(-4)	0.0036	0.122	0.01	0.0
[Fe XI]	7892	6.5(-4)	5.8(-4)	5.2(-4)	7.3(-6)	5.5(-4)	4.8(-4)	4.5(-4)	6.9(-6)	3.9(-4)	7.2(-4)	0.0013	0.115
Hβ	$erg\,cm^{-2}s^{-1}$	0.06	0.068	0.0758	0.082	0.072	0.082	0.087	0.086	0.10	0.057	0.046	0.032
[S III]	9532+	0.30	2.11	0.176	0.0022	0.30	0.91	1.06	0.11	0.41	1.51	0.015	1.6(-9)
[C I]	9850	9.(-9)	5.5(-9)	0.0	0.0	7.6(-9)	6.6(-9)	0.0	0.0	5.4(-9)	3.5(-9)	0.0	0.0
[S VIII]	9913	0.0029	0.0025	0.0023	5.7(-6)	0.0024	0.002	0.002	5.4(-6)	0.0017	0.0035	0.021	0.44
[S IX]	1.25	0.001	9.5(-4)	8.6(-4)	7.3(-6)	9.(-4)	7.9(-4)	7.5(-4)	6.9(-6)	6.4(-4)	0.0018	0.0019	0.023
[Si VI]	1.96	0.0038	0.0034	0.003	9.4(-8)	0.0032	0.0028	0.0027	8.9(-8)	0.0024	0.057	0.55	0.099
[Si VII]	2.48	0.0076	0.0067	0.006	3.8(-6)	0.0064	0.0056	0.0053	3.6(-6)	0.0046	0.01	0.22	0.50
[Si IX]	2.59	0.0064	0.0056	0.005	5.1(-5)	0.0053	0.0047	0.0044	4.8(-5)	0.0038	0.007	0.014	0.84
[Mg VIII]	3.03	0.007	0.0063	0.0057	1.7(-6)	0.006	0.0053	0.005	1.6(-6)	0.0043	0.0075	0.036	1.1
[Si IX]	3.9	0.012	0.010	0.0095	9.5(-5)	0.01	0.0088	0.008	9.(-5)	0.0071	0.013	0.028	1.8
[Mg VII]	5.5	0.0085	0.0075	0.0068	1.9(-7)	0.007	0.0063	0.006	1.8(-7)	0.005	0.011	0.47	1.44
[Mg V]	5.6	0.0017	0.0034	0.003	0.0034	0.0015	0.0022	0.0025	0.0026	0.003	0.21	0.46	0.0076
[Ne VI]	7.6	0.014	0.012	0.011	4.(-9)	0.0117	0.01	0.0097	3.9(-9)	0.0083	0.015	0.91	7.4
[Ar III]	8.99	0.17	0.285	0.033	0.0022	0.175	0.23	0.265	0.064	0.186	0.157	0.0018	2.5(-8)
[S IV]	10.54	0.033	0.65	2.28	0.40	0.034	0.075	1.77	2.8	0.127	2.125	0.393	0.001
[Ne II]	12.8	0.38	0.086	0.0035	2.8(-4)	0.39	0.46	0.11	0.011	0.395	0.027	2.2(-4)	3.9(-9)
[Ne V]	14.32	0.0024	0.0021	0.00187	0.0	0.002	0.0017	0.0016	0.0	0.0014	0.025	3.92	1.94
[Ne III]	15.55	0.168	1.36	1.5	1.38	0.149	0.172	1.07	1.35	0.180	1.62	0.31	2.(-4)
[S III]	18.7	0.115	0.35	0.033	4.2(-4)	0.116	0.197	0.25	0.0264	0.136	0.20	0.0015	2.9(-8)
[Ne V]	24.3	0.003	0.0028	0.0025	0.0	0.0026	0.0023	0.002	0.0	0.0019	0.012	1.73	1.03
[O IV]	25.9	0.026	0.0276	0.0188	0.025	0.022	0.02	0.014	2.4(-4)	0.034	0.39	5.98	0.185
[Fe II]	26.	0.019	9.3(-4)	8.8(-7)	0.0	0.019	0.0066	1.4(-5)	0.0	0.014	1.3(-4)	0.0	0.0
[S III]	33.5	0.021	0.069	0.0065	9.(-5)	0.021	0.038	0.048	0.005	0.025	0.042	3.3(-4)	5.1(-9)
[Si II]	34.86	0.047	0.015	5.5(-4)	6.2(-7)	0.046	0.023	0.0024	3.2(-5)	0.037	0.0054	2.6(-5)	0.0
[Ne III]	36.01	0.0105	0.092	0.1	0.092	0.0093	0.011	0.07	0.088	0.011	0.112	0.022	1.4(-5)
[O III]	51.81	0.455	0.75	0.74	0.74	0.46	0.61	0.62	0.65	0.488	0.895	0.364	2.2(-4)
[O I]	63.18	2.1(-5)	1.4(-5)	3.4(-7)	0.0	1.7(-5)	1.5(-5)	2.4(-6)	0.0	1.3(-5)	8.6(-6)	0.0	0.0
[O III]	88.36	0.057	0.097	0.094	0.103	0.058	0.077	0.078	0.083	0.06	0.117	0.048	3.(-5)
[O I]	145.5	7.1(-7)	4.7(-7)	1.1(-8)	0.0	5.8(-7)	5.1(-7)	8.(-8)	0.0	4.5(-7)	2.9(-7)	0.0	0.0
[C II]	157.7	5.6(-5)	6.4(-5)	2.9(-5)	3.5(-7)	4.8(-5)	5.6(-5)	1.6(-4)	1.25(-5)	5.3(-5)	6.8(-5)	8.2(-6)	0.0

Table 7 (continued)

The models : V_s=300 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{17}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	4.69	6.48	17.78	43.33	6.5	6.39	39.82	34.52
Si III	1206	0.0026	0.022	6.7(-4)	0.0	0.096	0.011	3.1(-5)	0.0
H I	1216	27.6	28.	28.95	28.7	27.59	28.56	28.81	28.7
N V	1240	0.12	0.19	5.55	4.03	0.168	0.62	5.87	2.73
S II	1256	0.0014	8.8(-5)	0.0	0.0	0.0117	8.4(-6)	0.0	0.0
Si II	1264	8.5(-5)	4.(-4)	0.0	0.0	0.0015	1.(-4)	0.0	0.0
O I	1302+	1.9(-7)	1.1(-6)	0.0	0.0	3.1(-7)	0.0	0.0	0.0
Si IV	1397	0.0021	0.18	0.019	0.0	0.075	0.17	0.0016	0.0
O IV	1401+	0.02	0.15	3.4	0.057	0.05	2.12	0.9	0.0078
N IV]	1486	0.0013	0.47	2.6	0.15	0.056	2.2	0.9	0.042
C IV	1550	0.10	5.66	24.28	6.96	0.877	23.66	14.63	3.85
He II	1640	0.21	1.89	7.97	8.4	0.474	5.84	8.2	8.6
Si III	1892+	0.114	0.3	0.0022	0.0	1.1	0.08	7.5(-5)	0.0
[Ne V]	3426	0.034	0.158	6.07	0.82	0.051	2.0	4.2	0.094
[O II]	3727	0.24	0.22	3.6(-4)	0.0	0.62	0.057	0.0	0.0
[Ne III]	3869+	0.25	2.8	0.035	3.3(-9)	2.26	1.53	0.0024	1.(-9)
[S II]	4073+	0.25	0.0012	0.0	0.0	0.24	3.5(-5)	0.0	0.0
[O III]	4363	0.03	0.55	0.035	1.9(-5)	0.35	0.69	0.0021	0.0
He II	4686	0.032	0.27	1.0	1.	0.0677	0.81	1.04	0.999
[O III]	5007+	9.78	49.63	1.24	4.3(-4)	38.82	40.38	0.062	0.0
[N I]	5200+	2.(-6)	1.7(-6)	0.0	0.0	1.5(-6)	0.0	0.0	0.0
He I	5876	0.15	0.12	0.0037	2.7(-4)	0.14	0.045	0.0014	1.2(-4)
[Fe VII]	6087	0.017	0.215	0.56	0.0034	0.032	0.91	0.15	1.6(-4)
[O I]	6300+	1.4(-4)	7.1(-5)	0.0	0.0	1.2(-4)	0.0	0.0	0.0
[Fe X]	6374	0.0055	0.0087	0.12	1.03	0.0078	0.0114	0.51	0.58
[N II]	6548+	0.15	0.089	2.(-4)	0.0	0.285	0.017	0.0	0.0
[S II]	6716	0.21	6.(-4)	0.0	0.0	0.138	1.6(-5)	0.0	0.0
[S II]	6731	0.43	0.0012	0.0	0.0	0.282	3.3(-5)	0.0	0.0
[O II]	7325	0.029	0.047	1.2(-4)	0.0	0.12	0.0155	0.0	0.0
[Fe XI]	7892	4.8(-4)	8.4(-4)	0.0089	0.75	7.(-4)	0.0012	0.09	0.976
Hβ	$erg\,cm^{-2}s^{-1}$	0.083	0.054	0.038	0.026	0.0589	0.0477	0.011	0.023
[S III]	9532+	0.89	0.336	2.7(-4)	0.0	1.83	0.028	5.8(-6)	0.0
[C I]	9850	6.5(-9)	0.0	0.0	0.0	5.5(-9)	0.0	0.0	0.0
[S VIII]	9913	0.0022	0.005	0.16	0.71	0.0033	0.015	0.41	0.666
[S IX]	1.25	7.9(-4)	0.0013	0.0055	0.15	0.0011	0.0017	0.03	0.36
[Si VI]	1.96	0.0056	0.24	0.38	0.007	0.041	0.51	0.13	5.4(-4)
[Si VII]	2.48	0.0056	0.034	0.6	0.14	0.0089	0.167	0.55	0.029
[Si IX]	2.59	0.0047	0.0084	0.116	3.7	0.0068	0.0125	0.74	5.53
[Mg VIII]	3.03	0.0052	0.0086	0.34	1.44	0.0074	0.025	0.97	0.85
[Si IX]	3.9	0.0088	0.016	1.2(-6)	7.75	0.0127	0.024	1.56	11.38
[Mg VII]	5.5	0.0062	0.042	1.45	0.48	0.0096	0.34	1.53	0.10
[Mg V]	5.6	0.02	0.42	0.085	1.7(-4)	0.16	0.53	0.012	9.7(-6)
[Ne VI]	7.6	0.01	0.033	4.73	4.66	0.0145	0.56	7.0	1.18
[Ar III]	8.99	0.22	0.05	6.(-6)	0.0	0.21	0.0043	6.(-7)	0.0
[S IV]	10.54	0.44	1.94	0.019	2.9(-5)	1.76	0.58	0.0018	1.6(-7)
[Ne II]	12.8	0.31	0.0038	1.(-6)	0.0	0.04	4.5(-4)	0.0	0.0
[Ne V]	14.32	0.0022	0.31	4.49	0.29	0.0166	3.06	2.32	0.028
[Ne III]	15.55	0.58	1.46	0.0066	7.2(-7)	1.57	0.5	3.6(-4)	2.(-7)
[S III]	18.7	0.19	0.041	2.6(-5)	0.0	0.25	0.0029	1.1(-6)	0.0
[Ne V]	24.3	0.0024	0.129	2.2	0.168	0.0087	1.33	1.21	0.017
[O IV]	25.9	0.096	1.22	1.98	0.0084	0.32	5.23	0.3	8.2(-4)
[Fe II]	26.	0.0056	1.6(-6)	0.0	0.0	2.7(-4)	0.0	0.0	0.0
[S III]	33.5	0.037	0.0086	6.(-6)	0.0	0.052	6.3(-4)	2.7(-7)	0.0
[Si II]	34.86	0.019	8.4(-4)	7.9(-9)	0.0	0.0066	4.8(-5)	0.0	0.0
[Ne III]	36.01	0.038	0.1	4.8(-4)	2.7(-8)	0.11	0.035	2.7(-5)	7.(-9)
[O III]	51.81	0.61	0.9	0.011	2.7(-6)	0.87	0.51	4.7(-4)	1.2(-8)
[O I]	63.18	1.5(-5)	2.8(-6)	0.0	0.0	1.4(-5)	0.0	0.0	0.0
[O III]	88.36	0.077	0.12	0.0014	3.9(-7)	0.11	0.067	6.4(-5)	1.6(-9)
[O I]	145.5	5.(-7)	9.(-8)	0.0	0.0	4.6(-7)	0.0	0.0	0.0
[C II]	157.7	5.6(-5)	8.1(-5)	2.13(-7)	0.0	5.7(-5)	1.3(-5)	1.7(-8)	0.0

Table 8

The models : V_s=300 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	1.64	1.64	0.42	0.55	1.64	1.64	1.65	0.8	0.39	0.53	0.79	30.13
Si III	1206	1.7(-6)	1.6(-6)	3.5(-4)	0.002	1.6(-6)	1.6(-6)	1.6(-6)	0.0018	5.6(-6)	0.0035	0.05	0.0
H I	1216	27.74	27.75	27.67	27.62	27.75	27.75	27.75	27.65	27.7	27.6	28.1	34.24
N V	1240	0.041	0.041	0.011	0.0138	0.04	0.041	0.042	0.02	0.01	0.0136	0.194	11.35
S II	1256	1.8(-6)	1.7(-6)	2.7(-4)	7.8(-7)	1.7(-6)	1.6(-6)	1.6(-6)	3.3(-6)	7.1(-6)	0.0017	0.0063	0.0
Si II	1264	4.7(-7)	4.4(-7)	2.3(-5)	1.(-5)	4.6(-7)	4.4(-7)	4.4(-7)	1.8(-5)	1.3(-6)	1.2(-4)	0.0012	0.0
O I	1302+	6.1(-8)	5.9(-8)	2.9(-8)	0.0	6.(-8)	5.9(-8)	5.9(-8)	4.5(-8)	1.6(-8)	1.2(-7)	2.9(-8)	0.0
Si IV	1397	2.2(-4)	2.2(-4)	9.8(-5)	0.065	2.2(-4)	2.2(-4)	2.2(-4)	0.0015	5.6(-5)	0.0059	0.162	0.001
O IV	1401+	0.007	0.0075	0.019	0.0024	0.0075	0.0075	0.0075	0.0035	0.0018	0.0033	3.35	6.5
N IV]	1486	3.2(-4)	3.2(-4)	8.4(-5)	0.058	3.1(-4)	3.3(-4)	3.2(-4)	1.2(-4)	7.5(-5)	6.2(-4)	1.5	10.
C IV	1550	0.034	0.034	0.0088	0.58	0.034	0.034	0.035	0.0167	0.0082	0.018	12.67	116.7
He II	1640	0.05	0.05	0.013	0.016	0.05	0.05	0.05	0.023	0.033	0.284	2.83	7.2
Si III	1892+	0.0013	0.0012	0.042	0.039	0.0013	0.0012	0.0012	0.092	0.004	0.18	0.2	0.0
[Ne V]	3426	0.012	0.012	0.003	0.004	0.0119	0.012	0.012	0.0058	0.0028	0.0044	1.57	4.14
[O II]	3727	0.047	0.045	0.37	0.013	0.045	0.045	0.046	0.28	0.19	0.76	0.41	8.9(-4)
[Ne III]	3869+	0.005	0.0049	0.0085	1.17	0.005	0.0048	0.0049	0.17	0.01	0.42	3.45	0.068
[S II]	4073+	0.065	0.065	0.052	3.5(-5)	0.065	0.063	0.063	8.(-4)	0.1	0.25	0.008	0.0
[O III]	4363	8.1(-4)	7.6(-4)	0.0087	0.138	7.8(-4)	7.6(-4)	7.6(-4)	0.018	0.0014	0.063	1.7	0.21
He II	4686	0.0075	0.0075	0.002	0.0023	0.0075	0.0075	0.0075	0.0035	0.0053	0.043	0.39	0.92
[O III]	5007+	1.91	1.86	4.26	21.37	1.88	1.85	1.85	6.38	2.2	15.5	76.4	5.89
[N I]	5200+	1.8(-6)	6.2(-7)	2.9(-7)	0.0	1.5(-7)	5.2(-7)	4.2(-7)	1.4(-6)	3.3(-6)	2.5(-6)	9.9(-8)	0.0
He I	5876	0.165	0.166	0.159	0.15	0.166	0.166	0.166	0.155	0.16	0.14	0.11	0.023
[Fe VII]	6087	0.006	0.0059	0.0015	0.002	0.006	0.0059	0.0059	0.0029	0.0014	0.005	0.91	0.11
[O I]	6300+	5.(-5)	4.9(-5)	8.5(-5)	0.0	4.9(-5)	4.9(-5)	4.9(-5)	7.4(-5)	7.(-5)	1.(-4)	2.2(-5)	0.0
[S III]	6312	7.8(-4)	7.5(-4)	0.0037	0.0015	7.7(-4)	7.5(-4)	7.5(-4)	0.0137	0.0015	0.016	0.014	8.8(-6)
[Fe X]	6374	0.0019	0.0019	4.9(-4)	6.4(-4)	0.0019	0.0019	0.0019	9.3(-4)	4.6(-4)	6.4(-4)	0.0043	0.52
[N II]	6548+	0.065	0.064	0.277	0.0083	0.064	0.063	0.063	0.21	0.20	0.365	0.155	1.6(-4)
[S II]	6716	0.095	0.093	0.19	2.6(-5)	0.094	0.093	0.093	7.5(-4)	0.12	0.18	0.0038	0.0
[S II]	6731	0.197	0.193	0.38	5.3(-5)	0.195	0.19	0.192	0.0015	0.25	0.37	0.0077	0.0
[O II]	7325	0.0023	0.0022	0.035	0.0022	0.0022	0.0022	0.0021	0.03	0.011	0.10	0.12	3.3(-4)
[Fe XI]	7892	1.6(-4)	1.6(-4)	4.2(-5)	5.5(-5)	1.6(-4)	1.6(-4)	1.7(-4)	8.(-5)	4.(-5)	5.7(-5)	2.(-4)	0.1
Hβ	$erg\,cm^{-2}s^{-1}$	0.239	0.24	0.93	0.714	0.24	0.24	0.239	0.49	1.0	0.72	0.43	0.33
[S III]	9532+	0.297	0.29	0.53	0.10	0.294	0.29	0.29	1.79	0.42	1.24	0.3	1.3(-4)
C I]	9850	2.3(-9)	2.3(-9)	0.0	0.0	2.3(-9)	2.2(-9)	2.(-9)	0.0	7.(-7)	0.0	0.0	0.0
[S VIII]	9913	7.3(-4)	7.2(-4)	1.9(-4)	2.4(-4)	7.3(-4)	7.2(-4)	7.3(-4)	3.5(-4)	1.8(-4)	2.8(-4)	0.0154	0.4
[S IX]	1.25	2.7(-4)	2.7(-4)	7.(-5)	9.1(-5)	2.7(-4)	2.7(-4)	2.7(-4)	1.3(-4)	6.5(-5)	9.3(-5)	2.6(-4)	0.022
[Si VI]	1.96	9.7(-4)	9.7(-4)	2.5(-4)	3.3(-4)	9.7(-4)	9.7(-4)	9.8(-4)	4.7(-4)	3.4(-4)	0.0276	0.554	0.1
[Si VII]	2.48	0.0019	0.0019	5.(-4)	6.5(-4)	0.0019	0.0019	0.0019	9.4(-4)	4.6(-4)	0.0014	0.236	0.49
[Si IX]	2.59	0.0016	0.0016	4.1(-4)	5.4(-4)	0.0016	0.0016	0.0016	7.8(-4)	3.9(-4)	5.6(-4)	0.004	0.79
[Mg VIII]	3.03	0.0018	0.0018	4.6(-4)	6.(-4)	0.0018	0.0018	0.0018	8.8(-4)	4.3(-4)	6.(-4)	0.033	1.04
[Si IX]	3.9	0.003	0.003	7.7(-4)	0.001	0.003	0.003	0.003	0.0015	7.2(-4)	0.001	0.0086	1.7
[Mg VII]	5.5	0.0021	0.0021	5.5(-4)	7.2(-4)	0.0022	0.0021	0.0022	0.001	5.2(-4)	0.0013	0.51	1.39
[Mg V]	5.6	8.5(-4)	8.5(-4)	9.1(-4)	0.0016	8.5(-4)	8.5(-4)	8.5(-4)	0.0011	0.0023	0.12	0.42	0.008
[Ne VI]	7.6	0.0035	0.0035	9.1(-4)	0.0012	0.0035	0.0035	0.0035	0.0017	8.5(-4)	0.0012	0.372	6.5
[Ar III]	8.99	0.174	0.174	0.2	0.0134	0.174	0.173	0.174	0.32	0.188	0.228	0.035	2.6(-6)
[S IV]	10.54	0.033	0.033	0.046	2.96	0.033	0.033	0.033	0.68	0.12	1.0	0.824	0.0077
[Ne II]	12.8	0.415	0.415	0.46	0.0012	0.42	0.414	0.414	0.28	0.423	0.31	0.028	5.5(-7)
[Ne V]	14.32	6.(-4)	6.(-4)	1.5(-4)	2.(-4)	6.(-4)	6.(-4)	6.(-4)	2.9(-4)	1.4(-4)	0.0059	1.71	2.32
[Ne III]	15.55	0.0776	0.077	0.049	1.54	0.077	0.077	0.077	0.59	0.11	0.666	0.96	0.011
[S III]	18.7	0.115	0.115	0.143	0.0186	0.115	0.115	0.115	0.46	0.138	0.22	0.029	1.(-5)
[Ne V]	24.3	7.9(-4)	7.9(-4)	2.(-4)	2.6(-4)	7.9(-4)	7.9(-4)	7.9(-4)	3.8(-4)	1.9(-4)	0.0023	0.79	1.20
[O IV]	25.9	0.0076	0.0076	0.002	0.003	0.0076	0.0076	0.0076	0.0021	0.014	0.22	3.56	1.92
[Fe II]	26.	0.0196	0.0199	0.015	1.5(-7)	0.0197	0.02	0.02	6.6(-5)	0.0158	0.0021	8.6(-6)	0.0
[S III]	33.5	0.021	0.021	0.027	0.0037	0.021	0.021	0.021	0.086	0.0254	0.043	0.006	2.4(-6)
[Si II]	34.86	0.0475	0.048	0.039	1.4(-4)	0.0477	0.048	0.048	0.0037	0.039	0.009	1.8(-4)	0.0
[Ne III]	36.01	0.0048	0.0048	0.003	0.104	0.0048	0.0048	0.0048	0.038	0.0069	0.045	0.07	8.2(-4)
[O III]	51.81	0.44	0.44	0.38	0.78	0.44	0.44	0.44	0.51	0.358	0.63	0.88	0.044
[O I]	63.18	8.5(-6)	8.4(-6)	2.5(-5)	0.0	8.5(-6)	8.4(-6)	8.5(-6)	1.7(-5)	2.3(-5)	1.(-5)	2.4(-6)	0.0
[O III]	88.36	0.055	0.055	0.048	0.10	0.055	0.055	0.055	0.064	0.045	0.08	0.117	0.006
[O I]	145.5	2.9(-7)	2.9(-7)	8.4(-7)	0.0	2.9(-7)	2.9(-7)	2.9(-7)	5.8(-7)	7.8(-7)	3.4(-7)	8.(-8)	0.0
[C II]	157.7	6.0(-5)	6.0(-5)	1.3(-4)	2.1(-5)	6.(-5)	6.(-5)	6.(-5)	3.9(-4)	1.3(-4)	1.(-4)	5.6(-5)	2.8(-7)

Table 8 (continued)

The models : V_s=300 km s^{-1}, n_0=300 cm^{-3}, D= 10^{19}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	0.44	0.64	4.75	60.13	0.51	0.73	24.51	49.2
Si III	1206	1.1(-4)	0.027	0.0013	0.0	0.002	0.059	3.9(-5)	0.0
H I	1216	27.63	27.6	33.1	30.	27.58	27.96	35.36	29.2
N V	1240	0.011	0.018	3.83	10.9	0.013	0.093	10.	4.95
S II	1256	9.4(-5)	0.0064	6.6(-6)	0.0	0.0011	0.0084	0.0	0.0
Si II	1264	1.1(-5)	5.5(-4)	1.5(-5)	0.0	8.7(-5)	0.0014	0.0	0.0
O I	1302+	2.4(-8)	5.9(-7)	0.0	0.0	8.5(-8)	1.5(-6)	0.0	0.0
Si IV	1397	1.9(-4)	0.087	0.024	0.0	0.0033	0.182	0.002	0.0
O IV	1401+	0.002	0.09	9.5	0.43	0.0032	2.1	8.2	0.015
N IV]	1486	1.(-4)	0.03	10.2	1.4	3.6(-4)	0.8	10.7	0.13
C IV	1550	0.0095	0.41	97.7	50.4	0.0144	7.0	118.1	11.43
He II	1640	0.0987	1.05	5.45	8.32	0.23	2.45	6.95	8.68
Si III	1892+	0.026	0.42	0.0037	0.0	0.138	0.27	8.7(-5)	0.0
[Ne V]	3426	0.0032	0.062	4.7	1.03	0.004	1.06	4.53	0.11
[O II]	3727	0.4	0.83	0.037	0.0	0.69	0.52	0.002	0.0
[Ne III]	3869+	0.062	2.12	0.91	2.4(-4)	0.3	3.65	0.118	0.0
[S II]	4073+	0.17	0.1	4.(-6)	0.0	0.26	0.017	0.0	0.0
[O III]	4363	0.0077	0.46	1.28	0.0012	0.044	1.54	0.33	0.0
He II	4686	0.0155	0.15	0.72	0.98	0.036	0.34	0.89	0.98
[O III]	5007+	5.2	44.74	45.95	0.025	12.81	75.3	9.87	0.0
[N I]	5200+	3.3(-6)	1.5(-6)	0.0	0.0	2.8(-6)	6.5(-7)	0.0	0.0
He I	5876	0.15	0.13	0.06	0.0039	0.14	0.12	0.027	4.5(-4)
[Fe VII]	6087	0.0017	0.16	0.57	0.0054	0.0035	0.82	0.156	3.1(-4)
[O I]	6300+	8.9(-5)	6.2(-5)	0.0	0.0	1.(-4)	3.2(-5)	0.0	0.0
[Fe X]	6374	5.2(-4)	8.7(-4)	0.088	1.09	6.1(-4)	0.0026	0.41	0.704
[N II]	6548+	0.28	0.3	0.0076	0.0	0.36	0.19	3.(-4)	0.0
[S II]	6716	0.17	0.055	1.6(-6)	0.0	0.19	0.008	0.0	0.0
[S II]	6731	0.35	0.11	3.2(-6)	0.0	0.39	0.016	0.0	0.0
[O II]	7325	0.032	0.17	0.012	0.0	0.086	0.145	6.8(-4)	0.0
[Fe XI]	7892	4.5(-5)	8.3(-5)	0.0058	0.75	5.5(-5)	1.4(-4)	0.067	1.07
Hβ	erg $cm^{-2}s^{-1}$	0.88	0.55	0.39	0.246	0.75	0.44	0.345	0.206
[S III]	9532+	0.72	0.94	0.004	0.0	1.16	0.36	2.2(-4)	0.0
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S VIII]	9913	2.1(-4)	0.001	0.123	0.74	2.6(-4)	0.01	0.34	0.713
[S IX]	1.25	7.5(-5)	1.3(-4)	0.0023	0.16	8.9(-5)	2.2(-4)	0.015	0.41
[Si VI]	1.96	0.0023	0.25	0.37	0.0068	0.018	0.53	0.134	5.(-4)
[Si VII]	2.48	5.4(-4)	0.03	0.55	0.14	0.001	0.18	0.53	0.028
[Si IX]	2.59	4.5(-4)	8.5(-4)	0.084	3.94	5.4(-4)	0.0026	0.56	6.0
[Mg VIII]	3.03	5.(-4)	0.0016	0.31	1.48	5.8(-4)	0.02	0.887	0.889
[Si IX]	3.9	8.3(-4)	0.0016	0.186	8.2	0.001	0.0054	1.22	12.2
[Mg VII]	5.5	5.9(-4)	0.05	1.35	0.476	9.5(-4)	0.388	1.47	0.105
[Mg V]	5.6	0.015	0.55	0.089	1.5(-4)	0.085	0.49	0.013	4.8(-6)
[Ne VI]	7.6	9.6(-4)	0.011	3.1	4.67	0.0011	0.224	6.1	1.175
[Ar III]	8.99	0.21	0.157	3.1(-4)	0.0	0.23	0.05	5.8(-6)	0.0
[S IV]	10.54	0.37	1.5	0.11	2.1(-4)	0.87	0.95	0.013	1.9(-8)
[Ne II]	12.8	0.39	0.14	8.1(-5)	0.0	0.33	0.04	1.9(-6)	0.0
[Ne V]	14.32	3.6(-4)	0.18	3.83	0.33	0.0034	1.287	2.7	0.026
[Ne III]	15.55	0.28	1.19	0.2	2.7(-5)	0.58	1.08	0.02	5.6(-8)
[S III]	18.7	0.18	0.12	3.5(-4)	0.0	0.22	0.036	1.7(-5)	0.0
[Ne V]	24.3	2.8(-4)	0.072	1.85	0.197	0.0014	0.587	1.39	0.017
[O IV]	25.9	0.055	1.08	5.49	0.05	0.172	3.0	2.65	0.0018
[Fe II]	26.	0.0078	1.3(-4)	0.0	0.0	0.0028	1.3(-5)	0.0	0.0
[S III]	33.5	0.034	0.025	8.2(-5)	0.0	0.043	0.008	4.2(-6)	0.0
[Si II]	34.86	0.023	0.0015	9.4(-7)	0.0	0.011	2.9(-4)	0.0	0.0
[Ne III]	36.01	0.018	0.083	0.014	2.(-6)	0.0388	0.776	0.0015	2.5(-9)
[O III]	51.81	0.45	0.86	0.43	1.5(-4)	0.59	0.91	0.077	2.8(-9)
[O I]	63.18	1.8(-5)	3.8(-6)	0.0	0.0	1.1(-5)	2.5(-6)	0.0	0.0
[O III]	88.36	0.057	0.11	0.058	2.2(-5)	0.075	0.12	0.01	0.0
[O I]	145.5	6.(-7)	1.2(-7)	0.144	0.0	3.8(-7)	8.5(-8)	0.0	0.0
[C II]	157.7	1.2(-4)	7.6(-5)	8.8(-6)	0.0	1.1(-4)	5.9(-5)	4.8(-7)	0.0

Table 9

The models : V_s=500 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{18}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	0.967	0.967	0.309	0.188	0.97	0.97	0.299	0.187	0.292	0.28	0.275	8.14
Si III	1206	10.37	10.37	12.87	0.01	10.37	10.38	10.95	0.144	8.85	4.13	0.146	4.7(-5)
H I	1216	28.96	28.96	29.28	0.0	28.96	28.96	29.26	28.89	29.24	29.18	28.86	30.09
N V	1240	0.091	0.091	0.029	0.017	0.091	0.091	0.028	0.017	0.04	0.11	0.44	3.46
S II	1256	1.97	1.97	2.64	6.9(-7)	1.97	1.97	2.21	3.2(-5)	1.79	0.83	0.009	0.0
Si II	1264	0.30	0.30	0.38	2.7(-5)	0.30	0.30	0.32	5.2(-4)	0.25	0.113	0.004	0.0
O I	1302+	3.(-5)	3.(-5)	9.5(-6)	0.0	3.(-5)	3.(-5)	9.2(-6)	0.0	9.(-6)	8.5(-6)	3.7(-5)	0.0
Si IV	1397	0.46	0.46	0.45	0.344	0.46	0.45	0.41	0.56	0.495	0.885	0.31	0.002
O IV	1401+	27.7	27.7	34.2	1.85	27.7	28.7	29.	1.06	25.6	19.2	9.6	3.7
N IV]	1486	18.6	18.5	22.0	1.4	18.5	18.5	19.4	0.94	17.2	13.2	6.76	3.6
C IV	1550	201.6	201.7	239.2	16.98	201.6	201.7	211.4	11.4	187.3	144.8	70.31	39.34
He II	1640	7.72	7.72	8.0	7.85	7.72	7.99	7.75	7.98	7.96	7.11	7.42	7.42
Si III	1892+	32.35	32.36	37.6	0.106	32.35	32.36	34.28	1.93	29.46	15.4	0.605	1.2(-4)
[Ne V]	3426	3.9(-4)	3.9(-4)	1.6(-4)	6.4(-6)	3.9(-4)	3.9(-4)	1.4(-4)	1.9(-6)	0.0018	0.028	0.69	2.2
[O II]	3727	0.5	0.5	0.16	2.9(-5)	0.5	0.5	0.15	6.5(-5)	0.15	0.14	0.34	8.8(-8)
[Ne III]	3869+	11.97	11.97	13.22	3.90	11.97	11.97	12.54	3.4	11.83	10.15	4.35	0.057
[S II]	4073+	2.4	2.4	2.6	6.6(-6)	2.4	2.4	2.5	4.5(-4)	2.3	1.3	0.03	0.0
[O III]	4363	0.022	0.022	0.022	0.005	0.022	0.022	0.02	0.0045	0.019	0.015	0.017	0.0056
He II	4686	1.0	1.0	1.04	1.14	1.0	1.0	1.05	1.13	1.05	1.06	0.99	1.12
[O III]	5007+	1.67	1.67	1.0	0.44	1.67	1.67	0.977	0.43	0.94	0.84	2.92	0.172
[N I]	5200+	3.6(-4)	3.6(-4)	1.1(-4)	0.0	3.6(-4)	3.6(-4)	1.(-4)	0.0	1.1(-4)	1.(-4)	2.3(-4)	0.0
He I	5876	0.007	0.007	0.0023	0.0029	0.007	0.007	0.0023	0.0035	0.0022	0.002	0.0176	0.054
[Fe VII]	6087	0.018	0.018	0.011	0.0015	0.018	0.018	0.01	0.0013	0.0134	0.058	0.62	0.113
[O I]	6300+	0.0073	0.0073	0.0023	0.0	0.0073	0.0073	0.0022	0.0	0.0022	0.002	0.015	0.0
[S III]	6312	0.4	0.4	0.45	7.6(-4)	0.4	0.4	0.42	0.026	0.39	0.002	0.03	8.5(-6)
[Fe X]	6374	0.012	0.012	0.0039	0.0023	0.012	0.012	0.0037	0.0023	0.0036	0.0035	0.0034	0.11
[N II]	6548+	0.30	0.30	0.097	3.7(-5)	0.30	0.30	0.094	1.(-4)	0.092	0.086	0.46	0.0
[S II]	6716	0.61	0.61	0.68	1.9(-6)	0.61	0.61	0.64	1.3(-4)	0.58	0.33	0.01	0.0
[S II]	6731	1.30	1.3	1.46	4.(-6)	1.3	1.3	1.38	2.9(-4)	1.24	0.70	0.022	0.0
[O II]	7325	0.048	0.048	0.015	8.2(-6)	0.048	0.048	0.015	1.(-5)	0.0144	0.0135	0.084	9.1(-8)
[Fe XI]	7892	0.0049	0.0049	0.0015	9.5(-4)	0.0049	0.0049	0.0015	9.4(-4)	0.0015	0.0014	0.001	0.013
Hβ	$erg\,cm^{-2}s^{-1}$	0.127	0.127	0.4	0.65	0.127	0.127	0.41	0.656	0.42	0.442	0.7	0.945
[S III]	9532+	7.48	7.48	7.47	0.024	7.48	7.48	7.66	0.885	7.2	5.29	1.07	1.3(-4)
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S VIII]	9913	6.9(-4)	6.9(-4)	2.2(-4)	1.3(-4)	6.9(-4)	6.9(-4)	2.1(-4)	1.3(-4)	2.1(-4)	2.2(-4)	0.0053	0.106
[S IX]	1.25	0.0023	0.0023	7.3(-4)	4.4(-4)	0.0023	0.0023	7.(-4)	4.4(-4)	6.9(-4)	6.5(-4)	0.001	0.004
[Si VI]	1.96	4.2(-6)	4.2(-6)	1.3(-6)	8.(-7)	4.2(-6)	4.2(-6)	1.3(-6)	8.(-7)	2.(-3)	0.064	0.4	0.087
[Si VII]	2.48	2.6(-4)	2.6(-4)	8.3(-5)	5.(-5)	2.6(-4)	2.6(-4)	8.(-5)	5.(-5)	8.7(-5)	0.0021	0.10	0.24
[Si IX]	2.59	0.0124	0.012	0.04	0.0024	0.0124	0.0124	0.0038	0.0024	0.0038	0.0036	0.0077	0.13
[Mg VIII]	3.03	6.4(-5)	6.4(-5)	2.(-5)	1.2(-5)	6.4(-5)	6.4(-5)	2.(-5)	1.2(-5)	1.9(-5)	3.4(-5)	0.0165	0.27
[Si IX]	3.9	0.023	0.023	0.0074	0.0045	0.023	0.023	0.0072	0.0045	0.007	0.0067	0.022	0.28
[Mg VII]	5.5	4.3(-6)	4.3(-6)	1.4(-6)	8.3(-7)	4.3(-6)	4.3(-6)	1.3(-6)	8.3(-7)	1.6(-5)	0.0025	0.20	0.65
[Mg V]	5.6	0.114	0.114	0.10	0.042	0.114	0.114	0.097	0.042	0.122	0.36	0.50	0.0293
[Ne VI]	7.6	2.2(-7)	2.2(-7)	7.(-8)	9.7(-4)	2.2(-7)	2.2(-7)	6.8(-8)	7.2(-7)	2.1(-6)	4.9(-4)	0.087	2.3
[Ar III]	8.99	0.377	0.377	0.39	0.0048	0.377	0.377	0.386	0.166	0.373	0.30	0.097	1.9(-4)
[S IV]	10.54	0.81	0.81	0.68	1.1	0.81	0.81	0.71	2.98	0.84	1.49	0.99	0.023
[Ne II]	12.8	0.003	0.003	0.001	6.8(-5)	0.003	0.003	0.001	3.5(-4)	9.6(-4)	8.3(-4)	0.0027	1.5(-5)
[Ne V]	14.32	3.7(-4)	3.7(-4)	1.4(-4)	7.8(-4)	3.7(-4)	3.7(-4)	1.3(-4)	6.5(-4)	0.0013	0.0244	0.586	1.57
[Ne III]	15.55	2.16	2.16	2.20	1.66	2.16	2.16	2.17	1.67	2.14	2.0	1.26	0.085
[S III]	18.7	0.56	0.56	0.53	0.002	0.56	0.56	0.52	0.079	0.49	0.37	0.106	4.7(-5)
[Ne V]	24.3	2.2(-4)	2.2(-4)	7.8(-5)	3.5(-4)	2.2(-4)	2.2(-4)	7.3(-5)	2.8(-4)	6.2(-4)	0.0104	0.20	0.57
[O IV]	25.9	11.12	11.13	11.0	7.16	11.12	11.13	10.8	7.1	10.57	10.07	6.58	1.58
[Fe II]	26.	0.0093	0.0093	0.0031	0.0	0.0093	0.0093	0.003	3.2(-7)	0.0029	0.0024	0.0066	0.0
[S III]	33.5	0.12	0.12	0.099	3.4(-4)	0.12	0.12	0.096	0.0126	0.09	0.066	0.0166	8.8(-6)
[Si II]	34.86	0.033	0.033	0.021	1.8(-5)	0.033	0.033	0.02	5.9(-4)	0.0186	0.011	0.0074	0.0
[Ne III]	36.01	0.147	0.147	0.147	0.10	0.147	0.147	0.144	0.104	0.14	0.13	0.079	0.0037
[O III]	51.81	0.062	0.062	0.022	0.024	0.062	0.062	0.021	0.0246	0.021	0.02	0.059	0.01
[O I]	63.18	7.7(-4)	7.7(-4)	2.5(-4)	0.0	7.7(-4)	7.7(-4)	2.4(-4)	0.0	2.3(-4)	2.2(-4)	7.(-4)	0.0
[O III]	88.36	0.0099	0.0099	0.0035	0.0035	0.0099	0.0099	0.0034	0.0035	0.0033	0.0031	0.0068	0.0014
[O I]	145.5	2.8(-5)	2.8(-5)	9.1(-6)	0.0	2.8(-5)	2.8(-5)	8.8(-6)	0.0	8.6(-6)	8.(-6)	2.2(-5)	0.0
[C II]	157.7	2.4(-4)	2.4(-4)	7.7(-5)	3.8(-8)	2.4(-4)	2.4(-4)	7.4(-5)	9.2(-7)	7.2(-5)	6.7(-5)	1.1(-4)	3.7(-8)

Table 9 (continued)
The models : V_s=300 $km\,s^{-1}$, n_0=500 cm^{-3}, D= 10^{18}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	0.288	0.269	1.42	39.28	0.28	0.258	6.36	42.49
Si III	1206	7.0	1.05	0.0026	0.0	4.69	0.249	9.6(-5)	0.0
H I	1216	29.22	29.07	29.12	31.21	29.19	28.34	29.71	30.61
N V	1240	0.063	0.21	1.46	5.55	0.1	0.41	3.15	3.97
S II	1256	1.44	0.179	3.5(-6)	0.0	0.955	0.042	0.0	0.0
Si II	1264	0.2	0.027	2.9(-5)	0.0	0.129	0.0074	0.0	0.0
O I	1302+	8.9(-6)	7.5(-6)	0.0	0.0	8.6(-6)	1.2(-4)	0.0	0.0
Si IV	1397	0.67	0.77	0.039	0.0	0.855	0.382	0.0035	0.0
O IV	1401+	23.7	12.7	9.0	0.3	20.0	11.0	5.5	0.034
N IV]	1486	15.7	9.0	6.5	0.56	21.6	7.6	4.66	0.12
C IV	1550	172.4	98.0	63.37	16.45	150.9	78.21	46.64	7.44
He II	1640	8.0	7.94	7.0	9.27	7.96	7.176	7.2	8.55
Si III	1892+	24.27	4.64	0.0085	0.0	17.21	0.98	2.5(-4)	0.0
[Ne V]	3426	0.007	0.15	2.27	1.67	0.022	0.58	2.37	0.39
[O II]	3727	0.144	0.123	4.(-5)	0.0	0.14	0.68	1.3(-7)	0.0
[Ne III]	3869+	11.29	7.65	1.075	2.8(-4)	10.41	4.9	0.12	0.0
[S II]	4073+	2.0	0.35	3.5(-6)	0.0	1.4	0.093	0.0	0.0
[O III]	4363	0.0176	0.0106	0.0015	4.7(-4)	0.0157	0.0125	0.0035	0.0
He II	4686	1.05	1.08	1.03	1.17	1.06	0.998	1.09	1.0
[O III]	5007+	0.906	0.86	0.187	0.011	0.85	1.84	0.11	0.0
[N I]	5200+	1.0(-4)	9.(-5)	0.0	0.0	1.(-4)	6.4(-4)	0.0	0.0
He I	5876	0.002	0.00168	0.025	9.(-4)	0.002	0.017	0.048	2.8(-4)
[Fe VII]	6087	0.023	0.248	0.49	0.014	0.048	0.56	0.157	0.0011
[O I]	6300+	0.0021	0.0018	5.6(-8)	0.0	0.0021	0.035	0.0	0.0
[Fe X]	6374	0.0036	0.0032	0.021	0.80	0.0035	0.0023	0.086	0.9
[N II]	6548+	0.09	0.077	6.4(-5)	0.0	0.087	0.77	0.0	0.0
[S II]	6716	0.49	0.096	1.1(-6)	0.0	0.36	0.028	0.0	0.0
[S II]	6731	1.06	0.21	2.4(-6)	0.0	0.78	0.061	0.0	0.0
[O II]	7325	0.014	0.012	3.7(-6)	0.0	0.0137	0.174	1.3(-7)	0.0
[Fe XI]	7892	0.0014	0.0013	0.0018	0.339	0.0014	9.1(-4)	0.0088	0.93
Hβ	$erg\,cm^{-2}s^{-1}$	0.428	0.479	0.844	0.37	0.438	0.69	0.94	0.263
[S III]	9532+	6.62	2.5	0.005	0.0	5.6	1.49	2.5(-4)	0.0
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S VIII]	9913	2.(-4)	5.9(-4)	0.035	0.514	2.1(-4)	0.0028	0.09	0.72
[S IX]	1.25	6.7(-4)	6.(-4)	0.0015	0.06	6.6(-4)	4.6(-4)	0.0032	0.22
[Si VI]	1.96	0.013	0.25	0.31	0.02	0.049	0.38	0.115	0.0026
[Si VII]	2.48	2.4(-4)	0.023	0.258	0.225	0.0014	0.08	0.258	0.077
[Si IX]	2.59	0.0037	0.0033	0.02	1.86	0.0036	0.003	0.094	4.66
[Mg VIII]	3.03	1.9(-5)	5.1(-4)	0.079	1.21	2.8(-5)	0.0094	0.226	1.24
[Si IX]	3.9	0.007	0.0061	0.043	3.92	0.0067	0.0134	0.20	9.65
[Mg VII]	5.5	2.1(-4)	0.036	0.597	0.72	0.0016	0.155	0.66	0.27
[Mg V]	5.6	0.189	0.665	0.197	7.5(-4)	0.317	0.535	0.046	3.9(-5)
[Ne VI]	7.6	4.3(-5)	0.0079	0.88	5.3	3.2(-4)	0.059	2.07	2.9
[Ar III]	8.99	0.35	0.186	0.0025	0.0	0.31	0.125	3.1(-4)	0.0
[S IV]	10.54	1.077	1.73	0.207	2.5(-4)	1.4	1.07	0.035	1.(-5)
[Ne II]	12.8	9.2(-4)	6.1(-4)	1.1(-4)	0.0	8.5(-4)	0.006	2.6(-5)	0.0
[Ne V]	14.32	0.0054	0.153	1.75	0.58	0.0185	0.47	1.7	0.108
[Ne III]	15.55	2.1	1.73	0.48	3.2(-5)	2.02	1.3	0.14	3.4(-9)
[S III]	18.7	0.45	0.185	9.4(-4)	0.0	0.39	0.133	7.5(-5)	0.0
[Ne V]	24.3	0.0024	0.057	0.61	0.25	0.008	0.165	0.60	0.05
[O IV]	25.9	10.4	9.2	4.49	0.035	10.15	6.72	2.173	0.0027
[Fe II]	26.	0.0027	0.0015	0.0	0.0	0.0025	0.016	0.0	0.0
[S III]	33.5	0.082	0.033	1.4(-4)	0.0	0.069	0.021	1.3(-5)	0.0
[Si II]	34.86	0.016	0.0042	3.1(-6)	0.0	0.012	0.0095	3.(-8)	0.0
[Ne III]	36.01	0.138	0.112	0.027	2.2(-6)	0.133	0.083	0.0066	0.0
[O III]	51.81	0.021	0.019	0.045	4.6(-5)	0.02	0.033	0.0133	0.0
[O I]	63.18	2.3(-4)	1.9(-4)	4.3(-8)	0.0	2.2(-4)	0.0015	0.0	0.0
[O III]	88.36	0.0032	0.0029	0.0051	5.6(-6)	0.0032	0.0039	0.0016	0.0
[O I]	145.5	8.4(-6)	6.9(-6)	1.4(-9)	0.0	8.(-6)	4.6(-5)	0.0	0.0
[C II]	157.7	7.1(-5)	5.9(-5)	1.(-6)	0.0	6.8(-5)	2.(-4)	8.2(-8)	0.0

Table 10

The models : V_s=500 $km\,s^{-1}$, n_0=300 cm^{-3}, D= 10^{19}cm

		1	2	3	4	5	6	7	8	9	10	11	12
t(Myr)		0.0	...	...	...	2.5	...	...	...	3.3	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.	0.01	0.1	1.	10
O VI	1033	0.97	0.97	0.97	0.207	0.97	0.97	0.97	0.246	0.292	0.28	0.273	10.86
Si III	1206	10.37	10.37	10.38	3.56	10.37	10.38	10.38	11.27	8.84	4.13	0.155	9.1(-5)
H I	1216	28.96	28.96	28.96	29.14	28.96	28.96	28.96	29.29	29.24	29.18	29.17	29.33
N V	1240	0.091	0.09	0.091	0.019	0.091	0.091	0.091	0.023	0.04	0.11	0.43	4.79
S II	1256	1.97	1.97	1.98	0.016	1.97	1.97	1.97	2.24	1.79	0.83	0.021	0.0
Si II	1264	0.30	0.30	0.303	0.081	0.30	0.30	0.30	0.32	0.253	0.112	0.0046	0.0
O I	1302+	3.(-5)	3.(-5)	3.(-5)	2.9(-6)	3.(-5)	3.(-5)	3.(-5)	7.8(-6)	9.(-6)	8.5(-6)	1.6(-4)	0.0
Si IV	1397	0.455	0.455	0.456	0.43	0.455	0.456	0.456	0.42	0.49	0.885	0.33	0.0027
O IV	1401+	28.0	28.0	28.	11.0	28.0	27.7	27.7	29.8	25.5	19.5	9.6	7.23
N IV]	1486	18.5	18.5	18.5	7.7	18.5	18.5	18.5	19.8	17.2	13.2	6.83	7.3
C IV	1550	201.6	201.7	201.7	86.47	201.6	201.7	201.7	215.9	187.3	144.8	70.77	67.54
He II	1640	7.73	7.73	7.73	7.92	7.73	7.73	7.73	8.0	7.98	7.96	7.15	7.28
Si III	1892+	32.4	32.4	32.37	16.76	32.35	32.36	32.36	35.0	29.46	15.42	0.722	2.(-4)
[Ne V]	3426	3.9(-4)	3.9(-4)	4.(-4)	4.3(-5)	3.9(-4)	3.9(-4)	3.9(-4)	1.3(-4)	0.0019	0.028	0.76	2.69
[O II]	3727	0.5	0.5	0.5	0.059	0.5	0.5	0.5	0.11	0.15	0.14	0.81	1.1(-6)
[Ne III]	3869+	11.97	11.97	11.97	8.27	11.97	11.97	11.97	12.67	11.82	10.15	4.72	0.12
[S II]	4073+	2.3	2.3	2.4	0.037	2.3	2.3	2.3	2.5	2.3	1.3	0.082	0.0
[O III]	4363	0.022	0.022	0.022	0.0128	0.022	0.022	0.022	0.021	0.019	0.015	0.01	0.0024
He II	4686	1.0	1.0	1.0	1.08	1.01	1.0	1.0	1.05	1.05	1.06	0.98	1.08
[O III]	5007+	1.67	1.67	1.67	0.83	1.67	1.67	1.67	0.942	0.94	0.835	1.44	0.069
[N I]	5200+	3.5(-4)	3.5(-4)	3.6(-4)	3.5(-5)	3.6(-4)	3.6(-4)	3.6(-4)	9.2(-5)	1.1(-4)	1.(-4)	8.4(-4)	0.0
He I	5876	0.007	0.007	0.007	0.0016	0.007	0.007	0.007	0.00187	0.0022	0.002	0.017	0.036
[Fe VII]	6087	0.018	0.018	0.018	0.0052	0.018	0.018	0.018	0.0097	0.0134	0.058	0.675	0.138
[O I]	6300+	0.0073	0.0073	0.0073	7.4(-4)	0.0073	0.0073	0.0073	0.0018	0.0022	0.002	0.043	0.0
[S III]	6312	0.4	0.4	0.4	0.277	0.4	0.4	0.4	0.43	0.39	0.27	0.04	3.9(-5)
[Fe X]	6374	0.012	0.012	0.012	0.0026	0.012	0.012	0.012	0.003	0.0036	0.0035	0.0036	0.135
[N II]	6548+	0.30	0.30	0.30	0.041	0.30	0.303	0.304	0.077	0.092	0.086	0.87	3.6(-8)
[S II]	6716	0.61	0.61	0.61	0.01	0.61	0.61	0.61	0.64	0.58	0.33	0.026	0.0
[S II]	6731	1.30	1.30	1.30	0.02	1.3	1.3	1.3	1.37	1.24	0.70	0.056	0.0
[O II]	7325	0.048	0.048	0.048	0.0056	0.048	0.048	0.048	0.012	0.014	0.0135	0.21	9.4(-7)
[Fe XI]	7892	0.0049	0.0049	0.0049	0.001	0.0049	0.0049	0.0049	0.0012	0.0015	0.0014	0.0011	0.016
$H\beta$	$erg\,cm^{-2}s^{-1}$	0.127	0.127	0.127	0.59	0.127	0.127	0.127	0.5	0.42	0.44	0.664	0.78
[S III]	9532+	7.48	7.48	7.48	6.10	7.48	7.48	7.48	7.79	7.2	5.29	1.292	5.6(-4)
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S VIII]	9913	6.9(-4)	6.9(-4)	6.9(-4)	1.5(-4)	6.9(-4)	6.9(-4)	6.9(-4)	1.7(-4)	2.1(-4)	2.2(-4)	0.0056	0.129
[S IX]	1.25	0.0023	0.0023	0.0023	4.9(-4)	0.0023	0.0023	0.0023	5.8(-4)	6.9(-4)	6.5(-4)	0.0011	0.0051
[Si VI]	1.96	4.2(-6)	4.2(-6)	4.2(-6)	8.9(-7)	4.2(-6)	4.2(-6)	4.2(-6)	1.(-6)	0.002	0.064	0.43	0.11
[Si VII]	2.48	2.6(-4)	2.6(-4)	2.6(-4)	5.5(-5)	2.6(-4)	2.6(-4)	2.6(-4)	6.6(-5)	8.7(-5)	0.0021	0.11	0.3
[Si IX]	2.59	0.0124	0.0124	0.012	0.0027	0.012	0.0124	0.0125	0.0032	0.0038	0.0036	0.0081	0.16
[Mg VIII]	3.03	6.4(-5)	6.4(-5)	6.4(-5)	1.4(-5)	6.4(-5)	6.4(-5)	6.4(-5)	1.6(-5)	1.9(-5)	3.4(-5)	0.0175	0.33
[Si IX]	3.9	0.023	0.023	0.023	0.005	0.023	0.023	0.023	0.0059	0.007	0.0067	0.023	0.35
[Mg VII]	5.5	4.3(-6)	4.3(-6)	4.3(-6)	9.2(-7)	4.3(-6)	4.3(-6)	4.3(-6)	1.1(-6)	1.6(-5)	0.0025	0.22	0.8
[Mg V]	5.6	0.114	0.114	0.114	0.072	0.114	0.114	0.114	0.098	0.122	0.357	0.52	0.038
[Ne VI]	7.6	2.2(-7)	2.2(-7)	2.2(-7)	4.7(-8)	2.2(-7)	2.2(-7)	2.2(-7)	5.6(-8)	2.1(-6)	4.9(-4)	0.097	2.7
[Ar III]	8.99	0.377	0.377	0.377	0.23	0.377	0.377	0.377	0.387	0.372	0.30	0.12	3.6(-4)
[S IV]	10.54	0.80	0.81	0.81	1.97	0.805	0.81	0.81	0.70	0.84	1.49	0.95	0.039
[Ne II]	12.8	0.003	0.003	0.003	3.7(-4)	0.003	0.003	0.003	8.3(-4)	9.6(-4)	8.3(-4)	0.008	2.7(-5)
[Ne V]	14.32	3.7(-4)	3.7(-4)	3.7(-4)	8.3(-5)	3.7(-4)	3.7(-4)	3.7(-4)	0.0094	0.0013	0.025	0.65	1.89
[Ne III]	15.55	2.16	2.16	2.16	1.98	2.164	2.164	2.164	2.18	2.14	2.0	1.25	0.116
[S III]	18.7	0.56	0.56	0.56	0.45	0.56	0.56	0.56	0.52	0.493	0.37	0.12	1.3(-4)
[Ne V]	24.3	2.2(-4)	2.2(-4)	2.2(-4)	4.3(-5)	2.2(-4)	2.2(-4)	2.2(-4)	6.3(-5)	6.2(-4)	0.01	0.227	0.67
[O IV]	25.9	11.12	11.13	11.13	9.22	11.12	11.13	11.13	10.81	10.57	10.1	6.88	2.21
[Fe II]	26.	0.0093	0.0093	0.0094	1.9(-4)	0.00934	0.0093	0.0093	0.0024	0.0029	0.0024	0.019	0.0
[S III]	33.5	0.12	0.12	0.12	0.076	0.12	0.12	0.12	0.095	0.09	0.066	0.019	2.3(-5)
[Si II]	34.86	0.033	0.033	0.033	0.011	0.033	0.033	0.033	0.0188	0.0186	0.011	0.009	5.1(-8)
[Ne III]	36.01	0.147	0.147	0.147	0.128	0.147	0.147	0.147	0.144	0.14	0.13	0.08	0.0059
[O III]	51.81	0.062	0.062	0.062	0.021	0.062	0.062	0.062	0.0186	0.021	0.02	0.0255	0.0188
[O I]	63.18	7.7(-4)	7.7(-4)	7.7(-4)	7.9(-5)	7.7(-4)	7.7(-4)	7.7(-4)	1.9(-4)	2.3(-4)	2.2(-4)	0.0018	0.0
[O III]	88.36	0.0099	0.0099	0.0099	0.0033	0.01	0.01	0.01	0.0029	0.0033	0.0032	0.003	0.0023
[O I]	145.5	2.8(-5)	2.8(-5)	2.8(-5)	2.9(-6)	2.8(-5)	2.8(-5)	2.8(-5)	7.1(-6)	8.5(-6)	8.(-6)	5.6(-5)	0.0
[C II]	157.7	2.4(-4)	2.4(-4)	2.4(-4)	3.3(-5)	2.4(-4)	2.4(-4)	2.4(-4)	6.1(-5)	7.2(-5)	6.7(-5)	2.4(-4)	2.9(-7)

Table 10 (continued)

The models : V_s=300 $km\,s^{-1}$, n_0=500 cm^{-3}, D= 10^{19}cm

		13	14	15	16	17	18	19	20
t(Myr)		4.5	...	...	...	5.4	...	...	...
U		0.01	0.1	1.	10.	0.01	0.1	1.	10.
O VI	1033	0.236	0.222	3.03	31.1	0.23	0.25	10.85	48.27
Si III	1206	6.94	1.02	0.012	0.0	4.67	0.29	2.6(-4)	0.0
H I	1216	29.25	29.11	29.43	29.94	29.22	28.53	29.16	31.78
N V	1240	0.0577	0.20	2.89	9.32	0.095	0.476	5.26	8.37
S II	1256	1.42	0.17	6.7(-4)	0.0	0.95	0.045	4.6(-6)	0.0
Si II	1264	0.195	0.026	3.2(-4)	0.0	0.128	0.008	0.0	0.0
O I	1302+	7.3(-6)	6.2(-6)	4.9(-5)	0.0	7.1(-6)	1.5(-4)	0.0	0.0
Si IV	1397	0.66	0.76	0.079	2.1(-5)	0.85	0.456	0.0058	0.0
O IV	1401+	23.5	12.4	16.6	1.7	20.	12.7	9.0	0.2
N IV]	1486	15.7	8.8	12.9	4.0	13.7	9.0	9.4	0.85
C IV	1550	170.9	95.85	11.4	63.62	150.4	92.16	86.11	37.03
He II	1640	7.99	7.95	7.55	8.4	8.0	7.28	7.36	9.17
Si III	1892+	24.17	4.59	0.04	0.0	17.22	1.21	5.8(-4)	0.0
[Ne V]	3426	0.0068	0.15	3.69	1.39	0.022	0.70	3.39	0.39
[O II]	3727	0.12	0.10	0.37	0.0	0.117	0.73	3.9(-6)	0.0
[Ne III]	3869+	11.26	7.63	1.74	0.004	10.42	5.62	0.22	4.8(-5)
[S II]	4073+	2.0	0.36	0.0011	0.0	1.3	11.7	1.8(-6)	0.0
[O III]	4363	0.0176	0.01	0.014	0.004	0.0157	0.0096	0.00017	4.(-4)
He II	4686	1.058	1.08	1.04	1.17	1.06	0.998	1.07	1.135
[O III]	5007+	0.858	0.63	2.25	0.095	0.80	1.26	0.054	0.007
[N I]	5200+	8.8(-5)	7.3(-5)	2.8(-4)	0.0	8.5(-5)	6.5(-4)	0.0	0.0
He I	5876	0.0018	0.0014	0.01	0.022	0.0017	0.015	0.024	0.002
[Fe VII]	6087	0.022	0.24	0.75	0.014	0.047	0.66	0.22	0.0019
[O I]	6300+	0.0018	0.0015	0.0157	0.0	0.0017	0.039	4.6(-9)	0.0
[Fe X]	6374	0.0029	0.0026	0.032	0.557	0.0029	0.0022	0.12	0.81
[N II]	6548+	0.074	0.063	0.45	0.0	0.07	0.78	2.8(-6)	0.0
[S II]	6716	0.49	0.095	4.2(-4)	0.0	0.36	0.035	4.4(-7)	0.0
[S II]	6731	1.06	0.20	8.5(-4)	0.0	0.78	0.075	9.6(-7)	0.0
[O II]	7325	0.012	0.0097	0.085	0.0	0.011	0.19	2.7(-6)	0.0
[Fe XI]	7892	0.0012	0.001	0.0024	0.22	0.0012	8.3(-4)	1.7(-4)	0.75
Hβ	$erg\,cm^{-2}s^{-1}$	0.52	0.584	0.71	0.63	0.535	0.758	0.83	0.37
[S III]	9532+	6.61	2.48	0.44	1.4(-5)	5.60	1.51	0.0016	0.0
[C I]	9850	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
[S VIII]	9913	1.7(-4)	5.5(-4)	0.052	0.367	1.8(-4)	0.0033	0.129	0.61
[S IX]	1.25	5.5(-4)	4.9(-4)	0.002	0.044	5.4(-4)	4.2(-4)	0.0043	0.20
[Si VI]	1.96	0.0126	0.25	0.44	0.0157	0.048	0.42	0.168	0.002
[Si VII]	2.48	2.1(-4)	0.022	0.38	0.169	0.0013	0.091	0.367	0.062
[Si IX]	2.59	0.003	0.0027	0.03	1.34	0.003	0.003	0.136	4.0
[Mg VIII]	3.03	1.6(-5)	4.9(-4)	0.12	0.88	2.3(-5)	0.0097	0.32	1.04
[Si IX]	3.9	0.0056	0.005	0.063	2.84	0.0055	0.012	0.29	8.26
[Mg VII]	5.5	1.9(-4)	0.035	0.87	0.55	0.0015	0.177	0.95	0.22
[Mg V]	5.6	0.187	0.67	0.178	0.0014	0.32	0.566	0.056	3.1(-5)
[Ne VI]	7.6	3.9(-5)	0.0076	1.33	4.0	2.9(-4)	0.069	2.83	2.39
[Ar III]	8.99	0.35	0.186	0.056	1.5(-6)	0.31	0.126	7.8(-4)	0.0
[S IV]	10.54	1.07	1.73	0.46	9.6(-4)	1.4	1.138	0.069	4.6(-5)
[Ne II]	12.8	7.7(-4)	5.(-4)	0.0018	0.0	7.1(-4)	0.0077	3.7(-5)	0.0
[Ne V]	14.32	0.005	0.148	2.4	0.677	0.018	0.54	2.26	0.10
[Ne III]	15.55	2.09	1.73	0.55	0.0014	2.02	1.32	0.146	4.6(-6)
[S III]	18.7	0.45	0.18	0.049	9.5(-7)	0.387	0.13	3.3(-4)	0.0
[Ne V]	24.3	0.0022	0.054	0.88	0.27	0.0075	0.19	0.80	0.048
[O IV]	25.9	10.36	9.16	5.9	0.22	10.11	7.28	2.95	0.012
[Fe II]	26.	0.0022	0.0012	7.7(-5)	0.0	0.002	0.0178	0.0	0.0
[S III]	33.5	0.08	0.032	0.0079	2.(-7)	0.068	0.021	5.4(-5)	0.0
[Si II]	34.86	0.015	0.0039	9.4(-4)	0.0	0.011	0.009	1.8(-7)	0.0
[Ne III]	36.01	0.138	0.11	0.035	8.1(-5)	0.133	0.085	0.008	3.2(-7)
[O III]	51.81	0.0177	0.0159	0.046	5.9(-4)	0.017	0.022	0.026	2.6(-5)
[O I]	63.18	1.9(-4)	1.5(-4)	7.6(-4)	0.0	1.8(-4)	0.0016	6.4(-8)	0.0
[O III]	88.36	0.0027	0.0025	0.0054	7.5(-5)	0.0027	0.0025	0.003	3.3(-6)
[O I]	145.5	6.8(-6)	5.6(-6)	2.3(-5)	0.0	6.6(-6)	5.(-5)	2.2(-9)	0.0
[C II]	157.7	5.8(-5)	4.8(-5)	1.1(-4)	0.0	5.6(-5)	2.1(-4)	7.0(-7)	0.0